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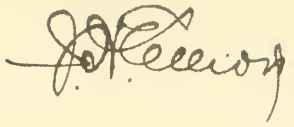

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TRANSACTIONS

OF THE

AMERICAN CLIMATOLOGICAL ASSOCIATION.

FOR THE YEAR 1903.

VOLUME XIX.

"The object of this Association shall be the study of Climatology and Hydrology and of Diseases of the Respiratory and Circulatory Organs."—*Constitution.*

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PHILADELPHIA:
PRINTED FOR THE ASSOCIATION.
1903.

NOTICE.

The Association assumes no responsibility for the statements and opinions expressed in the papers read at its meetings.

Copies may be had of the Secretary.

Vol. XI. contains a complete Index of 11 volumes.

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NORMAN BRIDGE, M.D., LOS ANGELES.

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LIST OF OFFICERS.

Presidents.

NAME.	YEAR.
A. L. Loomis	1884–5.
William Pepper	1886.
Frank Donaldson	1887.
A. L. Loomis	1888.
V. Y. Bowditch	1889.
Charles Denison	1890.
F. I. Knight	1891.
W. E. Ford	1892.
R. G. Curtin	1893.
A. H. Smith	1894.
S. E. Solly	1895.
J. B. Walker	1896.
E. Fletcher Ingals	1897.
E. O. Otis	1898.
Beverley Robinson	1899.
Abraham Jacobi	1900.
Robert H. Babcock	1901.
Samuel A. Fisk	1902.
Norman Bridge	1903.
James C. Wilson	1904.

Vice-Presidents.

F. I. Knight, W. H. Geddings	1884–5.
Frank Donaldson, Beverley Robinson	1886.
V. Y. Bowditch, R. G. Curtin	1887.
A. Y. P. Garnett, J. T. Whittaker	1888.
J. R. Leaming, E. T. Bruen	1889.

NAME.	YEAR.
A. L. Gihon, H. B. Baker	1890.
E. L. Trudeau, T. S. Hopkins	1891.
E. Fletcher Ingals, Beverley Robinson	1892.
A. H. Smith, E. O. Otis	1893.
I. Hull Platt, E. L. Trudeau	1894.
John H. Musser, G. R. Butler	1895.
Charles E. Quimby, James A. Hart	1896.
S. A. Fisk, John C. Munro	1897.
Beverley Robinson, C. F. McGahan	1898.
James A. Hart, R. C. Newton	1899.
R. H. Babcock, J. W. Brannan	1900.
Albert C. Peale, S. W. Langmaid	1901.
Norman Bridge, W. F. R. Phillips	1902.
James C. Wilson, H. S. Orme	1903.
Thomas Darlington, Thomas D. Coleman	1904.

Secretaries and Treasurers.

James B. Walker	1884–95.
Guy Hinsdale	1895.

LIST OF MEMBERS.

Honorary Members.

ELECTED

1903. Tyndale, J. Hilgard, Richards Block, Lincoln, Nebraska.
1897. Weber, Sir Hermann, 10 Grosvenor Street, W., London, England.
1897. Williams, Charles Theodore, 2 Upper Brook Street, W., London, England.

Corresponding Members.

1898. Eyre, G. G., Claremont, Cape Town, South Africa.
1898. Gache, Samuel, 729 Corrientes Street, Buenos Ayres, South America.
1898. Liceaga, Eduardo, 4 San Andres Street, Mexico.
1898. Orvananos, Domingo, 25 Chavarri Street, Mexico.
1898. Sunderland, Septimus, 11 Cavendish Place, Cavendish Square, W., London.
1902. Weber, F. Parkes, 19 Harley Street, W., London.
1898. Wragge, Clement L., Brisbane, Queensland, Australia.

Active Members.

1888. Abbot, Griffith E., Hot Springs,, N. C.
1897. Alden, C. H., P. O. Box 576, Redlands, Cal.

ELECTED

1897. Alton, Charles D., 86 Farmington Avenue, Hartford, Conn.
1898. Anders, Howard S., 1836 Wallace Street, Philadelphia.
1899. Anders, James M., 1605 Walnut Street, Philadelphia.
1890. Anderson, B. P., 106 North Cascade Avenue, Colorado Springs, Col.
1900. Arnold, Horace D., 427 Beacon Street, Boston.

1893. Babcock, R. H., 92 State Street, Chicago.
1898. Baldwin, Edward R., Saranac Lake, N. Y.
1901. Barlow, W. Jarvis, Wilcox Building, Los Angeles, Cal.
1898. Battle, S. Westray, Asheville, N. C.
1885. Bell, A. N., 337 Clinton Street, Brooklyn.
1896. Bergey, David H., Laboratory of Hygiene, University of Pennsylvania, Philadelphia.
1902. Bergtold, William H., 1460 Clayton Street, Denver, Col.
1896. Bernardy, E. P., 221 South 17th Street, Philadelphia.
1897. Blackader, Alexander D., 236 Mountain Street, Montreal, Canada.
1895. Boardman, W. S., 57 Hancock Street, Boston.
1897. Bonney, S. G., Stedman Building, Denver, Col.
1884. Bosworth, F. H., 41 Park Avenue, New York.
1885. Bowditch, V. Y., 506 Beacon Street, Boston.
1901. Bracken, Henry Martyn, 1010 Fourth Street, Minneapolis, Minn.
1891. Brannan, John W., 11 West 12th Street, New York City.
1894. Bridge, Norman, 217 South Broadway, Los Angeles, Cal.
1903. Brown, Lawrason, Saranac Lake, New York.

ELECTED

1903. Brown, Philip King, 1205 Van Ness Avenue, San Francisco, Cal.
1897. Brown, Sanger, Reliance Building, Chicago.
1890. Buckley, J. J., Missoula, Mont.
1886. Butler, G. R., 229 Gates Avenue, Brooklyn.

1896. Campbell, W. A., 424 North Nevada Avenue, Colorado Springs, Col.
1898. Casselberry, W. E., 34 Washington Street, Chicago, Illinois.
1894. Chapin, Frederick W., Pomfret, Conn.
1898. Chappell, Walter F., 7 East 55th Street, New York.
1898. Cleemann, Richard A., 2135 Spruce Street, Philadelphia.
1901. Cobb, J. O., U. S. Marine Hospital Service, Los Angeles, Cal.
1894. Coleman, Thomas D., 563 Greene Street, Augusta, Georgia.
1901. Collins, Charles Farnham, 50 West 55th Street, New York City.
1889. Coolidge, A., Jr., 613 Beacon Street, Boston.
1902. Craig, R. W., Phœnix, Arizona.
1885. Curtin, R. G., 22 South 18th Street, Philadelphia.

1892. Daland, Judson, 317 South 18th Street, Philadelphia.
1890. Darlington, Thomas, King's Bridge, New York City.
1897. Davis, N. S., Jr., 65 Randolph Street, Chicago.
1884. Denison, Charles, 823 14th Street, Denver.
1884. Didama, H. D., 424 South Salina Street, Syracuse, N. Y.
1902. Duffield, William, Phœnix, Arizona.

ELECTED

1897. Edson, Carroll E., McPhee Building, Denver, Col.
1903. Edwards, William A., Coronado, Cal.
1903. Elliott, J. H., Gravenhurst, Ontario, Canada.
1892. Elsner, H. L., Fayette Park, Syracuse, N. Y.

1887. Fisk, Samuel A., Denver Club, Denver, Col.
1902. Flint, W. H., Santa Barbara, Cal.
1885. Ford, Willis E., 266 Genesee Street, Utica, N. Y.
1897. Futterer, Gustav, 34 Washington Street, Chicago.

1896. Gardiner, C. F., 818 North Cascade Avenue, Colorado Springs, Col.
1886. Garnett, A. S., Hot Springs, Ark.
1898. Getchell, Albert C., 6 Linden Street, Worcester, Mass.
1892. Gibson, William M., 260 Genesee Street, Utica, N. Y.
1884. Glasgow, W. C., 2847 Washington Avenue, St. Louis.
1901. Guthrie, George W., 109 South Franklin Street, Wilkesbarre, Pa.

1893. Hance, I. H., Lakewood, N. J.
1891. Hart, James A., Colorado Springs, Col.
1900. Harvey, Thomas W., 463 Main Street, Orange, N. J.
1896. Heffron, John L., 528 South Salina Street, Syracuse, N. Y.
1893. Hinsdale, Guy, Hot Springs, Va.
1902. Hoagland, Henry W., 327 North Nevada Avenue, Colorado Springs, Col.

1884. Ingals, E. Fletcher, 34 Washington Street, Chicago.

ELECTED

1889. Jacobi, A., 19 East 47th Street, New York.
1888. Jayne, W. A., 217 McPhee Building, Denver, Col.
1901. Jennings, Charles Godwin, 457 Jefferson Street, Detroit, Mich.
1897. Johnson, Frank S., 2521 Prairie Avenue, Chicago.
1893. Judd, L. D., 3603 Powelton Avenue, Philadelphia.

1890. Kellogg, J. H., Battle Creek, Mich.
1899. Klebs, Arnold C., 100 State Street, Chicago.
1884. Knight, Frederick I., 195 Beacon Street, Boston.
1903. Kyle, D. Braden, 1517 Walnut Street, Philadelphia.

1887. Langmaid, S. W., 71 Newbury Street, Boston.
1899. Le Fevre, Egbert, 52 West 56th Street, New York.
1903. Lindley, Walter, 1414 South Hope Street, Los Angeles, Cal.
1896. Loomis, Henry P., 58 East 34th Street, New York.
1902. Lyle, B. F., Price Hill, Cincinnati, Ohio.

1902. Marvel, Philip, 1616 Pacific Avenue, Atlantic City, N. J.
1887. Mays, Thomas J., 1829 Spruce Street, Philadelphia.
1902. McBride, James H., Pasadena, Cal.
1894. McGahan, C. F., Aiken, S. C., and Bethlehem, N. H.
1899. Minor, Charles L., Asheville, N. C.
1886. Musser, John H., 1927 Chestnut Street, Philadelphia.

1900. Nammack, Charles E., 42 East 29th Street, New York.
1895. Newton, R. C., 42 Church Street, Montclair, N. J.
1899. Norrie, V. H., 21 West 37th Street, New York.
1888. Nunn, Richard J., 119 York Street, Savannah.

ELECTED

1884. Orme, H. S., 214 Douglas Building, Los Angeles, Cal.

1888. Otis, E. O., 381 Beacon Street, Boston.

1887. Peale, A. C., 605 12th Street, N. W., Washington, D. C.

1900. Pearce, F. Savary, 1409 Locust Street, Philadelphia.

1893. Peterson, Frederick, 4 West 50th Street, New York.

1895. Phillips, W. F. R., Weather Bureau, Washington, D. C.

1885. Platt, Isaac Hull, Bryn Mawr, Pa.

1887. Platt, Walter B., 802 Cathedral Street, Baltimore.

1902. Pottenger, F. M., O. T. Johnson Building, Los Angeles, Cal.

1891. Quimby, Charles E., 44 West 36th Street, New York.

1891. Ransom, C. C., 66 West 49th Street, New York (Richfield Springs).

1884. Reed, Boardman, 1831 Chestnut Street, Philadelphia.

1885. Rice, C. C., 123 East 19th Street, New York.

1901. Richardson, Charles W., 1317 Connecticut Ave., Washington, D. C.

1893. Risley, S. D., 1824 Chestnut Street, Philadelphia.

1899. Rives, William C., 1723 I Street, Washington, D. C.

1884. Robinson, Beverley, 42 West 37th Street, New York.

1890. Robinson, W. D., 2012 Mount Vernon Street, Philadelphia.

ELECTED

1902. Rochester, Delancey, 469 Franklin Street, Buffalo, N. Y.
1892. Roe, John O., 28 North Clinton Street, Rochester, N. Y.
1890. Rogers, E. J. A., 222 Colfax Avenue, Denver, Col.
1889. Ruck, Carl von, Asheville, N. C.

1884. Schauffler, E. W., 3835 Wyandotte Street, Kansas City, Mo.
1901. Sewall, Henry, 23 Eighteenth Avenue, Denver, Col.
1884. Shurly, E. L., 32 Adams Avenue, West Detroit, Mich.
1890. Smith, A. Alexander, 18 West 51st Street, New York.
1885. Smith, Andrew H., 18 East 47th Street, New York City.
1887. Smith, Frank Fremont, Palm Beach, Florida, and Bar Harbor, Maine.
1887. Solly, S. E., 2 North Cascade Avenue, Colorado Springs, Col.
1900. Stengel, Alfred, 1811 Spruce Street, Philadelphia.
1898. Stubbert, J. Edward, 25 East 45th Street, New York City.
1901. Swan, Will Howard, 706 North Nevada Avenue, Colorado Springs, Col.

1892. Taylor, H. Longstreet, 75 Lowry Arcade, St. Paul, Minn.
1896. Taylor, J. Madison, 1504 Pine Street, Philadelphia.
1885. Trudeau, E. L., Saranac Lake, N. Y.

1884. Walker, James B., 1617 Green Street, Philadelphia.
1891. Watson, E. W., 131 North 20th Street, Philadelphia.

ELECTED

1895. Weber, Leonard, 25 West 46th Street, New York.
1897. Whitcomb, H. H., Norristown, Pa.
1898. Whitney, Herbert B., 726 14th Street, Denver, Col.
1898. Williams, Francis H., 505 Beacon Street, Boston.
1898. Williams, Harold, 528 Beacon Street, Boston.
1885. Williams, H. F., 197 Gates Avenue, Brooklyn.
1884. Wilson, James C., 1509 Walnut Street, Philadelphia.
1901. Wyman, Walter, Surgeon-General, U. S. Public Health and Marine Hospital Service, Washington, D. C.

Total, 137 active members.

MINUTES.

The Twentieth Annual Meeting of the American Climatological Association was called to order by the President, Dr. Norman Bridge, at 9.50 A.M., on May 12, 1903, at the New Willard Hotel, Washington, D. C. The President, Dr. Bridge, then delivered the annual Presidential Address and announced the opening of the regular programme.

The following members and guests were in attendance:

Dr. C. D. Alton,
Dr. J. M. Anders,
Dr. Horace D. Arnold,
Dr. R. H. Babcock,
Dr. E. R. Baldwin,
Dr. W. Jarvis Barlow,
Dr. D. H. Bergey,
Dr. A. D. Blackader,
Dr. S. G. Bonney,
Dr. V. Y. Bowditch,
Dr. J. W. Brannan,
Dr. Norman Bridge,
Dr. Sanger Brown,
Dr. G. R. Butler,
Dr. Walter F. Chappell,
Dr. R. A. Cleemann,
Dr. C. F. Coleman,
Dr. Thomas D. Coleman,
Dr. R. G. Curtin,
Dr. Judson Daland,

Dr. T. Darlington,
Dr. Samuel A. Fisk,
Dr. A. C. Getchell,
Dr. W. M. Gibson,
Dr. W. C. Glasgow,
Dr. G. W. Guthrie,
Dr. I. H. Hance,
Dr. James A. Hart,
Dr. Thos. W. Harvey,
Dr. John L. Heffron,
Dr. Guy Hinsdale,
Dr. H. W. Hoagland,
Dr. A. Jacobi,
Dr. W. A. Jayne,
Dr. C. G. Jennings,
Dr. A. C. Klebs,
Dr. F. I. Knight,
Dr. E. Le Fevre,
Dr. H. P. Loomis,
Dr. Philip Marvel,
Dr. V. H. Norrie,
Dr. E. O. Otis,
Dr. A. C. Peale,
Dr. F. Savary Pearce,
Dr. W. F. R. Phillips,
Dr. I. H. Platt,
Dr. W. B. Platt,
Dr. C. E. Quimby,
Dr. B. Reed,
Dr. C. W. Richardson,
Dr. S. D. Risley,
Dr. W. C. Rives,
Dr. Beverley Robinson,
Dr. W. D. Robinson,
Dr. Delancey Rochester,

Dr. J. O. Roe,
Dr. E. J. A. Rogers,
Dr. E. W. Schauffler,
Dr. E. A. de Schweinitz,
Dr. Henry Sewall,
Dr. E. L. Shurly,
Dr. A. A. Smith,
Dr. F. Fremont Smith,
Dr. S. E. Solly,
Dr. J. E. Stubbert,
Dr. W. H. Swan,
Dr. E. L. Trudeau,
Dr. J. H. Tyndale,
Dr. J. B. Walker,
Dr. L. Weber,
Dr. H. H. Whitcomb,
Dr. F. H. Williams,
Dr. H. Williams,
Dr. H. F. Williams.

Guests: Mr. Jerome C. Cheney, Prof. Willis E. Moore.

The Executive Session was called to order by the President at 12.30 o'clock, and upon motion the reading of the minutes of the last meeting was dispensed with, having been published in the annual volume.

Dr. Hinsdale read the following report of the Treasurer and the report of the Council:

During the past year the Association has lost by death one member, Dr. S. H. Chapman, of New Haven, who joined in 1887.

Two members have resigned and thirteen have been proposed for election at this meeting. If all should be elected it would raise the number to 146.

The Secretary has edited and had printed and issued the eighteenth volume of the TRANSACTIONS. It contains 410 pages, and is the largest year's transactions yet issued

by the Association. The preliminary matter was printed in Philadelphia and the principal portion in London. Our arrangement with the *Journal of Balneology and Climatology* permitted the reprinting of some of our papers in London, and for this matter a rebate was allowed.

The volume cost the Society, when illustrated, bound, and delivered to members, about $558. Two hundred and sixty copies have been delivered to members of all grades, to libraries, and journals in the United States and abroad. In distributing the latter we have had, as usual, the courtesies of the Bureau of International Exchanges of the Smithsonian Institution, Washington. The fact that we print abroad causes some delay in the appearance of the volume.

It will be necessary to act on a resolution offered at the last meeting providing for a change in the Constitution. The proposed changes are not recommended by the Council for adoption.

The Association was represented by two delegates to the Fourteenth International Medical Congress in Madrid, Dr. Andrew H. Smith and Dr. Charles E. Nammack, of New York.

Report of the Treasurer.

The receipts of the Association have been as follows:

Balance on hand June 1, 1902	$105 16	
Received from members in payment of dues	830 00	
Total		$935 16

Expenditures:

For printing and distributing Eighteenth Annual Volume	$558 00	
To miscellaneous printing	106 76	
To stenographer	66 25	
Other expenses	182 48	
Total		913 49
Balance on hand May 12, 1903		$21 67

There is due from members about $150.

The report was regularly accepted and the Treasurer's accounts referred to the Auditing Committee. The President appointed on the Auditing Committee Dr. Harold Williams and Dr. T. D. Coleman; on the Nominating Committee, Dr. R. G. Curtin, Dr. R. H. Babcock, Dr. E. O. Otis, Dr. C. E. Quimby, and Dr. S. E. Solly.

In the afternoon the Association attended the opening session of the Sixth Congress of American Physicians and Surgeons. The Congress was opened by the President, Dr. W. W. Keen, of Philadelphia.

The subject considered was "The Pancreas and Pancreatic Diseases."

Papers were read by Dr. E. L. Opie, Prof. R. H. Chittenden, Dr. Simon Flexner, Dr. R. H. Fitz, Prof. von Mikulicz-Radecki, Dr. Roswell Park, Dr. C. G. Stockton, Dr. Herbert N. Williams, Dr. Maurice H. Richardson, and Dr. Moynihan.

In the evening the members attended the address of the President, Dr. Keen, the subject being "The Duties and Responsibilities of Trustees of Medical Institutions." A reception followed at the Arlington Hotel.

Wednesday, May 13th—Morning Session.

The meeting was called to order by the President at 9.30 A.M.

Executive Session.

The Executive Session was called to order by the President at 12.15 o'clock.

The Nominating Committee made the following nominations for the ensuing year: President, Dr. J. C. Wilson; Vice-Presidents, Drs. Thomas Darlington, and Thomas D. Coleman; Secretary and Treasurer, Dr. Guy Hinsdale; Member of the Council, Dr. Norman Bridge. They were unanimously elected.

Upon the recommendation of the Council, Dr. J. Hilgard Tyndale was unanimously elected an Honorary Member of the Association.

The Council's recommendation that the establishment of a class of associate members should not be adopted was endorsed by vote of the Association.

The Auditing Committee reported the Treasurer's accounts as correct.

The Secretary presented letters from Drs. Orme, of Los Angeles: Dr. McGahan, Dr. Ingals, and Dr. N. S. Davis, Jr., expressing regrets at not being present.

The following were elected active members: Dr. Lawrason Brown, Saranac Lake, N. Y.; Dr. Philip King Brown, San Francisco; Dr. W. A. Edwards, Coronado, Cal.; Dr. J. H. Elliott, Gravenhurst, Ontario, Canada; Dr. D. Braden Kyle, Philadelphia; Dr. Walter Lindley, Los Angeles.

On hearing the report of the Council relating to the subject of annual dues a discussion followed, after which Dr. J. B. Walker moved that the By-laws be amended so that the dues for 1904 shall be $7.50. Carried.

Adjourned.

After adjournment the members of the Association called upon Dr. and Mrs. C. W. Richardson at 1317 Connecticut Avenue, where luncheon was served.

In the afternoon the members of the Association attended the Session of the Sixth Congress of American Physicians and Surgeons. The subject for discussion was "The Medical and Surgical Aspects of the Diseases of the Gall-bladder and Bile Ducts." The participants were Prof. Ewald, Dr. J. H. Musser, Dr. C. A. Herter, Prof. Hans Kehr, Dr. W. J. Mayo, Dr. Geo. E. Brewer, Dr. Frank Billings, Dr. George Dock, Dr. W. S. Halsted, and Dr. Henry Sewall.

May 14th.—Executive Session, 12.30 p.m.

The Committee on Nomenclature made the following report:

Washington, D. C., May 12, 1903.

To the American Climatological Association.

Your Committee on Nomenclature beg to report the following classification of cases and results of treatment in pulmonary tuberculosis, and to recommend its provisional adoption by the Association for use by members in their records and published reports.

Your Committee clearly understand that the conditions which they have had to consider are always indefinite and at times indeterminate, and therefore cannot be accurately defined.

The classification suggested is, therefore, offered simply that by mutual agreement in the use of terms we may attain something approaching harmony in our inaccuracies.

It is, of course, understood that the sum-total of physical signs and constitutional symptoms, rather than the intensity of any one, is to be the basis for distribution of cases under this classification.

(Signed)

Vincent Y. Bowditch,
J. Edward Stubbert,
Edward R. Baldwin,
Frederick I. Knight,
Chas. E. Quimby,
Chairman.

Suggested Classification for Cases of Pulmonary Tuberculosis.

Incipient.—Slight physical and subjective signs, with history indicative of pulmonary tuberculosis.

Sputa, if present without bacilli.

1*st Stage.*—Definite physical signs of localized infiltration; total involvement less than half a lobe, whether at one or more points; cough and expectoration with bacilli; constitutional symptoms, slight. (In disseminated cases expectoration and bacilli may be absent with constitutional symptoms more severe.)

2*d Stage.*—Infiltration of single or multiple areas approaching or equal in amount to one lobe; or smaller area in stage of softening; cough and expectoration with bacilli; constitutional symptoms, severe.

3*d Stage.*—Infiltration in excess of one lobe or if less in stage of well developed excavation; more severe constitutional symptoms.

Classification of Results of Treatment in Pulmonary Tuberculosis.

Progressive.—All essential symptoms and signs continue unabated.

Quiescent.—Constitutional symptoms slight or entirely absent; physical signs improved or unchanged; cough and expectoration with bacilli still present.

Arrested.—Absence of all constitutional symptoms; expectoration and bacilli still present; physical signs may or may not persist; foregoing to have existed for at least three months.

Apparently Cured.—All constitutional symptoms and expectoration with bacilli absent for a period of three months.

Cured.—All constitutional symptoms and expectoration with bacilli absent for a period of two years under ordinary conditions of life.

Dr. Loomis moved that a copy of the Committee's report be printed and sent to members requesting opinions on the same. Carried.

Dr. Hinsdale, chairman of the Committee on Mineral Springs, reported that Dr. A. C. Peale had prepared a report on the American Lithia Waters and it was ordered to be printed in the Transactions.

The following resolution was offered by the Secretary and on the recommendation of the Council was adopted:

Resolved, That this Association is heartily in sympathy with the efforts of the United States Census Office and the United States Health and Marine Hospital Service to secure the extension of the Registration Area by the enactment of suitable laws and the use of a standard form of certificate of death as shown in Census Circular No. 71.

That we deem the proper presentation of vital statistics by States and cities as of the highest importance in the control of the disease.

Dr. A. C. Peale made a statement to the Association in reference to the proposed Government Exhibit of Mineral Waters of the United States at the St. Louis Exposition. It was moved by Dr. R. G. Curtin: That this Association commends the move by the United States Government to make a complete exhibit of the American Mineral Waters at the Louisiana Purchase Exposition at St. Louis in 1904. Seconded. Carried.

The Secretary called attention to the need of a more general support in the medical profession of the *Index Medicus.* To insure the continued support of the Carnegie Institution, more subscriptions are necessary. Five new subscribers were obtained at the meeting.

The Committee on Nominations made a supplementary report through the chairman, Dr. R. G. Curtin, recommending that the next meeting of the Association be held in Philadelphia about the 1st of June, 1904. This was carried and the place and time approved by the Association.

The resignation of Dr. S. A. Fisk from the Council was read, but it was not accepted by the Society.

On motion, Dr. E. O. Otis was appointed a delegate to represent this Association at the International Medical Congress on Tuberculosis to meet in Paris in 1904.

It was moved and seconded that the Association tender its thanks to Dr. Norman Bridge, the President; to Dr. Guy Hinsdale, the Secretary, and to Dr. W. F. R. Phillips, our

representative in the Committee of Arrangements for the Congress for their efforts to make the meeting a success. Carried.

Dr. Bridge thanked the Association for the honor conferred on him in electing him President for the meeting and spoke of the successful termination of the sessions.

A vote of thanks was given to Mr. F. S. Hight, the manager of the New Willard Hotel, for his courtesy to the Association as a body and as individuals, contributing largely to the comfort of those in attendance.

A telegram was read from Dr. James C. Wilson, who was detained at Philadelphia by professional duties, thanking the Association for his election as President for the ensuing year.

The business meeting was then adjourned.

In the afternoon the Association attended an illustrated lecture by Dr. Judson Daland on "Leprosy in the Hawaiian Islands," and a lecture by Mr. Gilbert McClurg on "The Topography and Climate of the Pike's Peak Region."

In connection with the latter address Dr. S. E. Solly made some interesting remarks about Colorado Springs and a projected Sanatorium for tuberculous patients in the vicinity.

A vote of thanks was extended to Dr. Daland and Mr. McClurg for their interesting lectures.

This closed the session.

GUY HINSDALE,
Secretary.

CONSTITUTION AND BY-LAWS.

CONSTITUTION.

Article I.—Name.

This Society shall be known as the American Climatological Association.

Article II.—Object.

The object of this Association shall be the study of *Climatology and Hydrology and of Diseases of the Respiratory and Circulatory Organs.*

Article III.—Membership.

Section 1.—This Association shall consist of *active, corresponding*, and *honorary* members, the former not to exceed one hundred and fifty, and the latter not to exceed ten.

Sec. 2.—Names of candidates for active membership, whose applications have been indorsed by *two* (2) active members, shall be sent to the Secretary at least thirty (30) days before the annual meeting. On approval of the Council, the applicant shall be balloted for at the annual meeting. Three (3) black balls shall be sufficient to reject a candidate. The Council shall have power to nominate active members.

Sec. 3.—The power of nominating honorary and corresponding members shall be vested in the Council. The election shall be conducted in the same manner as that for active members. Honorary members shall enjoy all the privileges of active members, but shall not be allowed to hold any office or cast any vote.

Sec. 4.—Any member of the Association absent from the meetings, in person or by contributed paper, for three (3) con-

secutive years, without sufficient cause, may be dropped from the list of members by vote of the Council.

Article IV.—Officers.

Section 1.—The officers of this Association shall consist of a *President*, two *Vice-Presidents*, a *Secretary and Treasurer*, who, with five other members and the delegate and alternate to the Executive Committee of the Congress of American Physicians and Surgeons shall constitute the *Council* of the Association.

Sec. 2.—Nominations. The officers, including the Council, shall be nominated by a committee of five (5) members, which committee shall be nominated by the President at the first session of each annual meeting, and shall report at the business meeting.

Sec. 3.—Elections. The election of officers shall take place at the business meeting. A majority of votes cast shall constitute an election.

Sec. 4.—The President, Vice-Presidents, Secretary and Treasurer shall enter upon their duties at the close of the annual meeting at which they are elected, and shall hold office until the close of the next annual meeting, or until their successors are elected.

Sec. 5.—Members of the Council, other than the President, Vice-Presidents, Secretary and Treasurer, shall hold office for five (5) years.

Sec. 6.— Vacancies. Any vacancy occurring among the officers of the Association during the year may be filled by the Council.

Article V.—Duties of Officers.

President and Vice-Presidents.

The President and Vice-Presidents shall discharge the duties usually devolving upon such officers. The President shall be *ex-officio* Chairman of the Council.

Secretary and Treasurer.

As Secretary, he shall attend and keep a record of all the meetings of the Association and of the Council, of which latter

he shall be *ex-officio* Clerk. At each annual meeting he shall announce the names of all who have ceased to be members since the last report. He shall superintend the publication of the TRANSACTIONS, under the direction of the Council. He shall notify candidates of their election to membership. He shall send a preliminary notification of the annual meeting two (2) months previous thereto, and the programme for the annual meeting at least two (2) weeks previous to its assembly, to all the members of the Association. He shall also send notification of the meetings of the Council to the members thereof. At each annual meeting of the Association he shall read the minutes of the previous meeting and of all the meetings of the Council that have been held during the current year.

As Treasurer, he shall receive all moneys due, and pay all debts therewith. He shall render an account thereof at the annual meeting, at which time an auditing committee shall be appointed to report.

ARTICLE VI.—COUNCIL.

The Council shall meet as often as the interests of the Association may require.

Four (4) members shall constitute a quorum.

It shall have the management of the affairs of the Association, subject to the action of the Association at its annual meetings.

It shall consider the claims of candidates recommended to it for admission to membership.

It shall not have the power to make the Association liable for any debts exceeding in total one hundred dollars ($100), in the course of any one year, unless specially authorized by a vote of the Association.

It shall have the entire control of the publications of the Association, with the power to reject such papers or discussions as it may deem best.

It shall have power to nominate active members at the annual meeting.

The Council shall have power to invite any gentleman, not a member, to read a paper at the annual meeting, on any subject within the scope of the objects of this Association.

The Council shall determine questions by vote, or—if demanded —by ballot, the President having a casting vote.

The Council shall constitute a Board of Trial for all offences against the Constitution and By-Laws, or for unbecoming conduct, and shall have the sole power of moving the expulsion of any member.

The President, or any two members, may call a meeting, notice of which shall be transmitted to every member two (2) weeks previous to the meeting.

Article VII.—Papers.

Section 1.—The titles of all papers to be read at any annual meeting shall be forwarded to the Secretary not later than one (1) month before the first day of the meeting, in order to appear on the printed programme.

Sec. 2.—No paper shall be read before the Association which has already been printed or been read before another body.

Article VIII.—Quorum.

A quorum for business purposes shall be ten (10) members.

Article IX.—Amendments.

This Constitution may be amended by a four-fifths ($\frac{4}{5}$) vote of all the members present at an annual meeting, provided that notice of the proposed amendment has been printed in the notification of the meeting at which the vote is to be taken.

BY-LAWS.

1. Meetings of the Association shall be held annually.

2. The time and place of the meetings shall be determined by the Council.

3. The dues of active members shall consist of an annual assessment not to exceed seven and a half ($7.50) dollars. The initiation fee shall be ten ($10) dollars. Members in arrears shall not be

entitled to vote. Those in arrears for two (2) years may be dropped from membership by recommendation of the Council.

4. Order of business meeting.

First day:

Calling the roll of members;
Minutes of previous meeting;
Treasurer's report;
Appointment of auditing committee;
Appointment of nominating committee;
Report of Council on recommendations for membership.

Second day—Morning session:

Report of nominating committee;
Election of officers;
Election of members;
Report of the committee on health resorts;
Miscellaneous business;
Adjournment of business meeting.

Any of these By-Laws may be amended, repealed, or suspended by a two-thirds vote of the members present at any meeting.

PRESIDENT'S ADDRESS.

BY NORMAN BRIDGE, M.D.
LOS ANGELES, CALIFORNIA.

THE association together in society organisations of men engaged in like pursuits and with like interests and ambitions tends to both profit and pleasure.

It is logical that a number of men who are engaged in the study of the influences of the air of different portions of the earth's surface upon the health and lives of the people should find themselves organised into a climatological association. It is natural too that they should also study, and study most, among the diseases of human kind those that are pre-eminently affected by the outdoor air—otherwise climate. So the respiratory and circulatory diseases naturally fall to such a study, since they are most quickly and extensively affected by the moving stratum of aërial substance immediately surrounding the earth. But these are not the only diseases so affected—all the slow, chronic states involving different forms of debility and results of perturbation of the nutritional forces of the body are as truly, if not as promptly and as evidently, affected by climates.

And while studying the effects of air, and its contaminations and its varying conditions on the human body, it is natural to include the sources and supply of that other substance that is, to us all, next in indispensability to life, namely,

the water we use. This logical falling together of the objects of study on the part of the American Climatological Association is much more potent and determining than the terms of its bye-laws. The bye-laws may say you shall study thus and thus, but fences for human thought are full of holes and ineffective, and men will follow the bent which the laws of psychology, evolved by the developmental creation of the race, have directed and will direct.

The subjects of study of this organisation form a logical and most interesting series, and are capable of being surpassingly useful to society. I can imagine nothing more useful for the comfort and longevity of the race than to learn how to take advantage of the facts of the circumambience of the earth to the end that we may take its benefits and shun its dangers.

But this is a day of intense question as to the facts, and it behoves us to search carefully for these and to be jealous of them, and alert to separate them from fancy and falsehood. The facts must be found and recorded, regardless of any use that may be made of them subsequently. And they ought to be used in a scientific manner if used at all. We shall never reach our highest success till we develop an avidity for scientific facts as such.

The social features of such a society as this are of the highest value, especially when they garnish some good scientific work. We like to come together and meet our fellows, to look into their faces, to tell stories with them, and touch their elbows and their hands, and it does us good. In thought through the year we associate them with their respective homes, and like to think of them as living and thriving there. But this is a sorry comfort unless we can think of them also as working as well as living and thriving—and working always in the interest of scientific truth and in complete loyalty to it.

We cannot let the good-fellowship that belongs to so harmonious a society as ours betray us into dropping in the serious work of the organisation. It seems to me that we are by the character of our compact under greater temptation to do this than any other of the societies of this congress of science. We migrate from place to place for two-thirds of our meetings, and climates are offered for our practical study and are exploited before us. They are exhibited to us in their best belongings and are apologised for if they appear for the time to be guilty of misbehaviour. They are for the time of our visits made to contribute to our personal pleasure, and they entice us as far as possible from serious study. I would not discourage or disparage all this, but only point out some of its influences on the larger intellectual growth.

There is danger that we shall become slower to discover new actual facts of various climates, and will descend to rhapsodies about particular ones that happen to please us and that we happen to know something about.

If we are to become scientific climatologists we must gather and classify a lot of facts. Our guesses, and our opinions not based on facts, are not enough. One swallow has not come to make a summer, and that a few sick people migrate to a new country and recover from some disease proves little—perhaps proves nothing as to climate. Large figures not small ones are what we need, and we ought to eliminate the coincidences if we can. To learn the facts that prove things about the effects of a climate takes time and painstaking labour, and the results are not often formidable or showy. A man will work for long to add one fact to the world's knowledge of anatomy, physiology, pathology, or chemistry, and feel well repaid for his efforts; but we are liable to forget that the same rule ought to apply to climatology. Our writing and talking about climates too often

tend to remind one of the advertisements of rival merchants, each one of which declares that at a particular place the public can always buy the best goods at the lowest prices.

Then, I think we often find ourselves napping, and forget about the chemistry of the atmosphere, and that it is substantially the same the earth over, except when contaminated by local conditions, by the dust of the earth, the animals, insects and parasites of localities, and by the habitations and business of mankind. We also look for some medicinal virtue in the air, and forget the great influence on the sick of its temperature, its currents, its degree of moisture, and the amount of day- and sunlight passing through it. These conditions make the potent environment of the human body, but they are not mysterious—and we are liable to look for and love the mysterious. Even when we understand and admit these cardinal facts as the things in a climate that greatly affect human beings, and when we put away all thought of mystery about them, we still are in danger of reaching wrong conclusions, and for several reasons.

First of all, we usually make our generalisations as to the effects of climate by its apparent influence on the new comer sick rather than on its permanent resident population. This subjects us to several possibilities of error. The effects witnessed in the bodies of sojourners in a new climate might be fairly attributed to the influence of the latter if other things were equal. But other things never are equal, or nearly so, nor can they be, and every one of these invalid new-comers is under conditions, and subject to manifold influences, that are markedly different from those that obtained at his home where his invalidism began.

How shall we, how can we, in judging of the changes in the body of such a patient, separate the effects upon him, good and bad, of the climate from that of such influence as his

change of place and scenes ; change or cessation of occupation , his rest from old cares and the effects of new ones ; his interest and amusement with new experiences, and homesickness for the old ones ; of new and perhaps unusual emotions of fear, grief, despair as to health and personal condition, and his material prospects ?

There is no discounting, and there is no disposition to discredit, the good effects that come to patients who leave their usual environment and go off and get well. Such facts stand as data for study and reasoning. It is only that we shall not let our enthusiasm for the thing called climate run away with our judgment, and lead us to attribute impossible powers to a single good influence. This mistake is common, and it is unfair to science, which seeks the exact truth. It moreover does a vast amount of pathetic harm to some invalids who are deluded into leaving behind them and neglecting many powers for help that are within their grasp, and going long distance in a delusive search for a miracle.

To discredit the miraculous claims as to the good effects of certain much-lauded climates, and to search for their real effects, means no disloyalty to any good influence of climate. This scepticism is rather the essence of the highest loyalty, for it means fealty to the truth ; and nothing is ever gained in the long run in any other course.

A major number of those who seek the benefits of climate are of the tuberculous class. These people catch at straws any way, and they are apt to have more or less exalted notions as to what climates can do for their disease. Many of them go to famous climates at great expense and inconvenience, when they are hopelessly sick and must die speedily. Those who know the facts, and who witness this melancholy migration, can hardly fail to regard it as one of the greatest tragedies of modern times. It ought to be lessened ; for it cannot be entirely stopped.

This Association, by its study and publications, has done incalculable good to a vast number of consumptives who have gone to better climates and recovered. And it is not surprising that a few who cannot possibly be helped by the influences that have done such good to the many, have been led by their hope, untempered by wisdom, to rush off to quicker deaths than awaited them at home.

As to this deplorable tendency, we have a duty that stares us in the face, and that is to try to prevent the remediless cases from ever leaving their homes and comforts. The general profession, scattered throughout the country, is the only instrumentality that is capable of repressing to any great degree this unfortunate, even suicidal, migration; and the profession ought to be conscious of the responsibilities that are upon it.

It is probably not true (as has been charged) that practising physicians often send hopeless consumptives away to "climates" mainly for the purpose of getting rid of them, but their conduct at times certainly gives warrant for such a suspicion. An eminent physician in an eastern city once examined a patient's throat, and found a large number of tuberculous ulcers on the pharynx and palate, and all the tissues extremely tender and painful. The patient was weak and breathless, had a slight cough and some fever, and was distinctly cyanotic. The doctor at once said that medicine would be useless. Had he left his statement thus no harm would have been done, beyond the grief that comes of a grave prognosis. But he must add the treacherous hint that climate alone could do the case any good. That was enough, and the man posted off three thousand miles, to travel back in a month in a casket. No hint was given him or his friends of the utter hopelessness of his disease, and they were left to infer, if they were not told, that probably a few months in the new climate might lead to improvement or even recovery.

I know of a case of extensive tuberculous infiltration of one lung, with enormous œdema and ulceration of the arytenoid regions of the larynx, and acute suffering in every act of deglutition, that was sent over two thousand miles with connivance at the impression that climate could cure the patient. The case went back to his home to die in a few weeks.

Another recent case was that of a man, aged 60, who had cavities in both lungs, Bright's disease and high fever, and travelled 3,000 miles, to die in less than a month.

These are fair samples of a large number of hopeless cases that are constantly being carried across the continent to die. What can physicians be thinking about to permit, without protest, such cases to leave their homes on such a quest? How can they make a settlement with conscience after advising such a thing?

I know there are the border-line cases which may or may not be helped, about which there is a fair question whether anything can do them any good, and some of these may properly be allowed to go away from home after climate cure; and I do not forget that men sometimes recover who have been condemned by their doctors to death, and that we are amazingly fallible.

But the border-line cases who are financially unable to go off to a climate, and who must be homesick to death if they go, should be taught the great value of the outdoor treatment at home. It is a thing of happy moment that the great benefits of this treatment are now coming to be known, and can be honestly recommended for any consumptive, rich or poor.

Many patients are allowed to make useless journeys to climates at great expense and great inconvenience, because it seems heartless to deprive them of the mental and moral boon of feeling that they have done all that they could. But

home outdoor treatment in a poor climate is so perfect a substitute for the best climate under the stress of poverty and loneliness and poor care of the sick, that no physician can justify himself in failing to insist upon it for the cases I have described. It is better for these patients than the best climate, except with means to live sumptuously.

Climatic treatment of consumption is at best expensive. Home outdoor treatment, plus contentment, conveniences of life, the care and assistance of family and friends, is better than any climate away from home, for the majority of people of moderate means.

We have created a widespread popular belief in certain curative effects of climate; those effects exist, but only for patients who still have fair physiologic forces, and it is our duty to try to prevent a blind faith in their power to raise the dead.

There is another good reason for discouraging the advanced and hopeless cases from leaving home for health. It will tend to arouse and educate the public to the most cardinal truth that the best time to find climatic benefit for a tuberculous patient is early in the disease, while the powers of life are little impaired, and a small amount of tissue is involved. Just the opposite course is often pursued; patients are sent away late, to the loss of life and the unfair discredit of the good influences of the climates.

SOME NOTES ON NASSAU.

BY SAMUEL A. FISK, A.M., M.D.
DENVER, COLORADO.

SUMMERLAND in mid-winter; roses in January; muslin gowns at Christmas; doors and windows open day and night; almost constant sunshine; snow and slush eliminated; such are some of the attractions of Nassau as a resort. It is a winter resort, pure and simple, and the season is the three months of January, February and March, though some people do go a little earlier and some stay a little later. All of this to be had within easy reach of New York City, a sail of three days and a half taking one to Nassau; or, should one prefer, he can go by rail and boat in a little over two days. This rapid transition from winter to summer, with its setting of blue skies, blue and malachite seas, white soil and tropical foliage, makes the change seem like going into fairyland. What, in more detail, are the attractions and what the disadvantages of the place?

There is the negative one of getting away from winter in the north. But there are other places to go to. Southern California, some five hundred miles north of Nassau, furnishes an exemption from the cold and snow of a New England winter; but then Southern California seems so far away—the entire continent has to be traversed to get there. The Sandwich Islands are further still, even though they are south and offer an attractive climate. There is the whole

range of the Atlantic Coast, to the very tip of Florida, with its climates of various sorts, sea-board and inland, but not island. One could go to the Bermudas and get an island climate; but he would still be several hundred miles north of Nassau, and the Bermudas are said to be rainy and damp. Or he could keep on south and have an island climate at Jamaica; but he would be only 18 degrees away from the Equator, and that is not what is sought.

Nassau is decided on by one seeking a winter resort. It is south, at sea-level, one hundred and sixty miles to sea, and on an island.

It is as though one were on the deck of a large ship—in the form of an ellipse, 20 by 6 miles, approximately twice the size of the island of Nantucket—anchored in mid-ocean, 950 miles south of New York City, and 160 miles east of the southern tip of Florida. This would bring Nassau 250 miles north of Honolulu, and 650 north of Manila. The fact that Nassau is on a small island, in mid-ocean, must not be lost sight of, as this gives the advantage of an ocean climate, with the additional advantage of space to move around on.

In many ways it resembles Colorado, only it is at sea-level and not a mile up in the air. Consequently, its barometric pressure is the one to which so many are accustomed. Its soil is peculiarly dry, and rain does not stand on it in puddles. It is of coral formation; of a soft, white lime rock, which can be quarried with the saw, and which makes a kind of natural asphalt with the rain. Its streets and walks are easily swept and shed the wet rapidly, while they are not dusty. Vegetation seems to thrive wherever it can take root.

This is a land of pure air. No dust, no smoke, no atmospheric impurities, especially when the wind blows from the north or east, and their allied quarter, which the tables show is most of the time in the months under consideration. This

1900. STATION : NASSAU. Longitude 77°21 W. Latitude 25°5 N. Barom. above mean sea level 25ft. Therms. above ground 35ft. Gauge 33ft.

Months	Mean Pressure	Air Temperatures									Relative Humidity			Solar Radiator
				Means of			Absolute Min. and Max.							
		8 a.m.	3 p.m.	Mean	Min.	Max.	Min.	Date	Max.	Date	8 a.m.	3 p.m.	Mean	Solar Maximum
January	30·160	72·9	74·3	73·6	66·1	77·4	61·8	31st	83·3	3rd	74	66	70	140·0
February	30·124	71·6	72·5	72·1	63·8	75·1	54·0	19th	84·0	8th	73	69	71	146·3
March	30·055	73·8	74·6	74·2	67·9	77·9	59·0	14th	87·7	28th	70	66	68	155·7
April	30·040	73·7	74·7	74·2	71·3	81·7	64·0	2nd	91·0	26th	79	74	76	155·0
May	30·005	80·8	79·4	80·1	74·1	84·5	69·0	1st	93·0	24th	72	75	74	150·0
June	30·014	83·6	89·9	86·8	74·7	88·4	72·5	7th	96·0	23rd	68	76	72	156·0
July	30·078	84·6	84·9	84·8	75·1	89·4	69·7	11th	93·7	31st	72	72	72	160·3
August	30·078	86·3	87·0	86·7	75·8	90·6	73·0	1st	95·0	25th	64	61	63	160·0
September	30·012	86·0	84·8	85·4	72·4	88·5	69·0	7th	95·7	19th	62	68	65	154·7
October	29·950	82·4	81·9	82·2	73·8	85·5	69·4	28th	89·0	25th	72	72	72	144·0
November	30·065	77·1	79·0	78·1	66·1	80·3	57·0	21st	90·0	4th	67	63	65	142·3
December	30·094	73·4	76·6	75·0	63·3	80·1	55·5	22nd	86·8	14th	70	65	68	140·0
Year	30·056	78·9	79·0	79·4	70·4	83·3	—	—	—	—	70·3	69	69·6	150·4

Months	Amount of Cloud			Rainfall			Weather—Number of Days				Wind—Number of Observations of									Mean Velocity of Wind
	8 a.m.	3 p.m.	Mean	Total	Max.	Date	Rain	Overcast	Clear	Thunder Storms	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm	
January	6·5	6·3	6·4	0·91	0·40	30th	7	27	4	—	3½	8½	13	3	1	—	½	½	1	5·2
February	6·1	6·1	6·1	1·47	0·67	22nd	9	23½	6½	—	4	1	6	5½	5	1	2	3½	—	5·5
March	7·1	6·1	6·6	3·27	2·07	28th	12	25	6	1	1½	5	7	5½	3½	2	1½	3½	1½	4·7
April	6·5	5·8	6·2	0·49	0·19	25th	8	26	4	1	2½	6½	8½	9	1½	½	—	1½	—	5·9
May	7·6	8·0	7·8	7·37	1·29	15th	15	22	4	4	1	8½	8½	2½	3½	2	1	3	1	4·3
June	7·1	4·1	5·6	2·51	1·06	17th	9	30	0	5	½	5½	11½	8	1½	½	½	—	2	3·8
July	7·2	7·1	7·1	6·68	2·03	16th	20	30	1	6	2½	21½	6½	—	—	—	—	—	½	4·3
August	6·6	6·7	7·2	2·64	0·50	14th	19	31	0	7	—	8½	15½	4	—	—	—	½	2½	4·4
September	6·6	6·6	6·6	14·51	4·61	5th	14	29	1	2	1½	8	12	6½	—	½	—	1	½	4·5
October	7·0	7·2	7·1	8·32	3·07	15th	15	29	2	3	4½	10½	5	5½	1½	½	½	2	1	6·0
November	5·5	5·1	5·3	1·41	1·20	12th	6	29	10	1	3	11	10	3	1	1	—	—	1	10·0
December	5·9	6·0	6·0	1·74	0·56	25th	10	25	9	—	3	9½	4½	5	3	½	—	1½	4	7·3
Year	6·6	6·3	6·5	51·32	—	—	144	326½	47½	30	25	85	123	64	21½	8½	6	17	15	5·5

1901. STATION : NASSAU. Longitude 77°21 W. Latitude 25°5 N. Barom. above mean sea level 25ft. Therms. above ground 35ft. Gauge 33ft.

Months	Mean Pressure	Air Temperatures									Relative Humidity		Solar Radiator	
		8 a.m.	3 p.m.	Mean	Means of Min.	Means of Max.	Absolute Min. and Max. Min.	Date	Max.	Date	8 a.m.	3 p.m.	Mean	Solar Maximum
January	30·102	70·1	74·0	72·1	59·7	77·0	55·0	29th	84·5	1st	83	78	81	130·0
February	30·057	69·4	73·5	71·5	61·4	77·0	55·5	21st	88·0	11th	83	82	83	129·8
March	30·104	72·5	75·4	74·0	63·7	79·4	58·0	17th	87·8	31st	80	80	80	136·7
April	30·034	73·0	77·4	75·2	67·6	79·7	60·0	23rd	88·8	1st	80	74	77	137·6
May	29·978	77·6	80·8	79·2	71·5	83·4	63·0	6th	87·0	19th	98	65	92	136·6
June	30·045	80·9	82·8	81·9	76·2	85·7	72·0	13th	90·0	2nd	84	80	82	133·2
July	30·024	82·3	84·4	83·4	79·4	87·3	70·0	14th	90·2	14th	69	80	75	141·9
August	30·047	79·7	85·4	82·6	78·6	87·9	75·0	17th	90·1	14th	64	77	71	148·4
September	29·989	82·3	84·2	83·3	78·0	88·1	74·0	27th	91·0	4th	84	80	82	148·6
October	29·977	80·4	82·3	81·4	75·3	83·8	70·5	23rd	90·0	1st	77	76	77	148·9
November	30·080	73·6	75·4	74·5	70·1	77·2	63·0	19th	83·0	5th	70	64	67	124·6
December	30·103	71·2	73·2	72·2	67·2	75·1	59·5	19th	80·5	15th	77	75	76	111·1
Year	30·045	75·3	79·1	77·6	70·7	81·8	64·6	—	—	—	79	76	79	135·6

Months	Amount of Cloud			Rainfall			Weather—Number of Days.				Wind—Number of Observations of									Mean Velocity of Wind
	8 a.m.	3 p.m.	Mean	Total	Max.	Date	Rain	Overcast	Clear	Thunder Storms	N.	N.E.	E.	S.E.	S.	S.W	W.	N.W.	Calm	
January	4·1	4·1	4·1	0·49	0·16	22nd	8	23	8	1	7	7½	1	6½	2	2	½	2½	2	6
February	4·2	4·1	4·2	1·00	0·77	19th	6	18	10	1	4½	7	2	½	3½	4	—	3	3½	6
March	5·0	4·1	4·6	0·30	0·14	21st	4	22	9	1	3	5	3	7	6	2	1	3½	½	9
April	3·0	4·1	3·6	1·40	1·03	19th	5	22	8	1	1½	10½	2	3	1½	3	—	7½	1	8
May	6·0	5·1	5·6	9·26	2·01	19th	13	27	4	7	3	4½	1	4½	9½	2	1½	4½	½	8
June	9·0	8·1	8·6	14·04	2·83	13th	18	30	—	2	½	1	7½	12	7½	—	—	—	1½	8
July	8·2	8·5	8·4	8·15	4·38	3rd	25	31	—	4	½	3	12	11½	3½	—	—	½	—	10
August	8·0	8·0	8·0	7·54	1·74	20th	27	30½	½	6	½	1½	6½	14	5½	1	—	—	2	7
September	7·1	8·0	7·6	8·32	1·27	6th	23	29	1	3	1½	2	7	13	4½	½	—	½	1	7
October	7·6	6·4	7·0	10·06	4·31	22nd	21	28½	2½	2	5	10½	11	1½	½	½	—	½	1½	12
November	5·3	4·6	5·0	0·30	0·10	11th	7	19½	10½	—	8½	11	2½	1½	1	½	—	3½	1½	11
December	7·1	8·0	7·6	0·97	0·30	18th	16	27½	3½	—	6½	3½	10½	3½	2½	½	1	2½	½	10
Year	6·2	6·1	6·2	61·83	—	—	173	308	57	28	42	67	66	78½	47½	16	4	28½	15½	8½

1902. STATION: NASSAU. Longitude 77°21 W. Latitude 25°5 N. Barom. above mean sea level 25ft. Therms. above ground 35ft. Gauge 33ft.

Months	Mean Pressure	Air Temperatures									Relative Humidity			Solar Radiator
					Means of		Absolute Min. and Max.							
		8 a.m.	3 p.m.	Mean	Min.	Max.	Min.	Date	Max.	Date	8 a.m.	3 p.m.	Mean	Solar Maximum
January	30·102	70·1	74·0	72·1	59·7	77·0	55·0	29th	84·5	1st	83	78	81	104·2
February	30·057	69·4	73·5	71·5	61·4	77·0	55·5	21st	88·0	11th	83	82	83	111·8
March	30·104	72·5	75·4	74·0	63·7	79·4	58·0	17th	87·8	31st	80	80	80	127·3
April	30·045	75·2	77·1	76·2	68·9	79·6	62·0	20th	84·0	15th	71	70	71	120·6
May	30·039	78·3	80·1	79·2	72·8	82·9	70·0	4th	89·0	28th	71	68	70	136·3
June	30·042	81·6	82·7	82·2	76·2	85·0	71·0	3rd	92·0	27th	72	73	73	126·7
July	30·096	83·6	85·5	84·6	76·5	88·3	69·0	22nd	91·0	8th	73	73	73	136·2
August	30·006	84·4	86·5	86·0	75·3	89·4	69·0	7th	94·0	23rd	73	70	72	135·7
September	30·027	84·0	85·5	84·8	75·3	88·8	69·0	21st	92·0	23rd	77	77	77	131·5
October	29·998	82·6	84·6	83·6	74·3	80·5	68·0	30th	92·0	1st	76	70	73	122·6
November	30·040	77·7	79·0	78·4	70·9	81·4	67·0	10th	84·0	18th	75	71	73	123·0
December	30·133	74·1	76·0	75·1	70·7	77·9	58·5	28th	85·0	6th	76	70	73	114·0
Year	30·075	77·8	80·0	79·0	70·5	82·3	—	—	—	—	76	74	74	124·2

Months	Amount of Cloud			Rainfall			Weather—Number of Days				Wind—Number of Observations of								Mean Velocity of Wind
	8 a.m.	3 p.m.	Mean	Total	Max.	Date	Rain	Overcast	Clear	Thunder Storms	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm	
January	4·1	4·1	4·1	0·49	0·16	22nd	8	23	8	1	7	7½	1	6½	2	2	½	2½	2	6·0
February	4·1	4·2	4·2	1·00	0·77	19th	6	18	10	1	4½	7	2	½	3½	4	—	3	3½	5·9
March	5·0	4·1	4·6	0·30	0·14	21st	4	22	9	1	3	5	3	7	6	2	1	3½	1½	6·2
April	6·0	5·6	5·8	2·69	0·68	16th	11	20½	9½	—	3	7	7½	4	4	1	—	2	1½	9·0
May	6·0	6·0	6·0	0·50	0·31	22nd	6	23½	7½	—	½	8	17½	2½	½	½	1	—	½	8·2
June	8·0	7·2	7·6	5·60	2·32	14th	20	26	4	—	½	3½	11½	6½	2½	2½	—	½	2½	8·8
July	6·0	8·0	7·0	2·45	0·91	12th	14	31	—	6	—	5	8½	10½	4½	½	—	—	2	7·0
August	7·5	7·4	7·2	6·81	2·43	2nd	17	31	—	4	3	4	3	10	2	1½	½	—	7	5·0
September	8·0	8·0	8·0	5·73	2·40	20th	16	30	—	3	—	2	4½	14	1½	½	½	½	6½	5·3
October	8·5	9·0	8·8	5·53	1·28	17th	21	30	1	2	2	3½	3	4½	1½	1½	—	3½	11½	5·0
November	8·1	7·1	7·6	3·62	1·19	18th	14	26	4	—	—	7	11	5½	3½	1	½	1	½	9·6
December	7·1	7·1	7·1	3·04	1·98	31st	15	27½	3½	—	5	8	9	1½	4	½	½	2	½	9·6
Year	6·5	6·5	6·5	37·76	—	—	152	308½	56½	18	28½	67½	81½	73	35½	17½	4½	18½	38½	7·1

Meteorological Observations for January, February, and March, 1903.

Months	Mean Pressure	Air Temperatures									Relative Humidity			Solar Radiator
		8 a.m.	3 p.m.	Mean	Means of Min.	Means of Max.	Absolute Min. and Max. Min.	Date	Max.	Date	8 a.m.	3 p.m.	Mean	Solar Maximum
January	30·095	72·2	74·4	73·3	65·4	77·3	54·5	8th	84·5	12th	82	78	85	108·1
February	30·142	74·4	76·3	75·4	68·1	78·7	58·0	20th	82·0	9th	80	78	79	115·0
March	30·095	75·3	77·6	76·5	68·2	79·2	62·5	20th	84·0	22nd	72	67	70	128·2

Months	Amount of Cloud			Rainfall			Weather—Number of Days			Wind—Number of Observations									Mean Velocity of Wind
	8 a.m.	3 p.m.	Mean	Total	Max.	Date	Rain	Clear Sky	Overcast	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm	
January	8·0	8·5	8·3	6·74	3·95	19th	21	—	31	3	5	$6\frac{1}{2}$	$4\frac{1}{2}$	6	1	2	1	2	9
February	8·5	7·8	8·2	1·72	0·53	23rd	13	$2\frac{1}{2}$	$25\frac{1}{2}$	$1\frac{1}{2}$	$4\frac{1}{2}$	7	5	8	$\frac{1}{2}$	—	1	$\frac{1}{2}$	10
March	7·0	7·0	7·0	1·94	1·14	29th	9	$2\frac{1}{2}$	$28\frac{1}{2}$	0	6	15	$5\frac{1}{2}$	2	0	$1\frac{1}{2}$	$1\frac{1}{2}$	$\frac{1}{2}$	11

wind-direction means that the air comes to Nassau after crossing hundreds upon hundreds of miles of ocean, and consequently is pure.

It is a land of sunshine. Experience will bear out this assertion, even though the tables may seem to induce doubt. But here it must be remembered that the records represent only two brief moments in the twenty-four hours, viz., at 8 a.m. and 3 p.m., and that there is a large field for guessing on the part of the observer, as he records only what he thinks he sees at those two moments; and that the percentage of "cloudy" weather (including "partly cloudy" or "overcast") is to "clear" as 7 : 3, which means that the day may be a practically clear one and yet be recorded as cloudy. White canvas hats are the rule amongst the visitors, and travellers all comment on the glare.

Again, an outdoor life is the rule. This is a great feature. Doors and windows are open all of the time and one constantly lives in the air. This is rendered possible by the large amount of sunshine, the slight motion, or velocity, of the wind, and the great equability of the temperature. This last is always warm, at the *minimum* being about the temperature at which we recommend that our houses should be kept, and at the *maximum*, in the shade, temperate. The change between the highest and lowest air-temperature is always moderate and can easily be provided for by slight, additional wraps. Fires, for heating purposes, are practically unknown, and no provision is made for them. In the sun, on the other hand, because Nassau is so far south, the temperature is high, and perspiration—active perspiration, on exertion—flows. Hence the care necessary to be taken not to check the action of the skin, to avoid draughts, and not to catch cold.

But if Nassau is characterised by a dry soil, a large amount of sunshine, a slight wind velocity, an equable temperature,

opportunities to lead an out-of-door life, and an exceptionally pure air, it must be borne in mind that it is at sea-level and nearly under the Tropic of Cancer—conditions that would make a dense air, a heated air, and, in turn, a humid air. This, in actual life, we find to be so, as the relative humidity is high, and the actual grains of vapour large: iron rusts, shoes mildew, bichloride tablets deliquesce. Of course, there is no snow or frost, and the rainfall is large (50·82 inches is the mean given for seventeen years—or three and a half times that of Colorado). The three months under consideration are remarkably free from rain and contribute but a small, a very small, amount to this sum total. The dews may be heavy—often $\frac{1}{100}$ of an inch—in which respect it resembles Southern California, from which, however, it differs essentially in not having fogs. Thunder showers are rare in the winter.

We have seen fit to contrast Colorado and Nassau because, while they are so alike in some important factors, they are at variance in others, and are, as it were, complementary of each other. In each there is the ability to lead an out-of-door life on a dry soil, in a remarkably pure air, flooded with brilliant sunshine and without fogs or high winds. All this in Colorado, at an elevation, in a rare, dry air, marked by a considerable variability of temperature. At Nassau this is done at sea-level, in a dense, moist air, marked by equability of temperature. In Colorado the climate is stimulating, bracing: at Nassau it is soothing, enervating. In the former the physical attractions are of a rugged, mountainous character; in the latter they pertain largely to the sea, its brilliant and varied colouring, the fishing, sailing, bathing. Indeed, the rich colouring of the sea, in its variegated blues and greens; the azure sky, with the fluffy cumulus clouds floating idly around; the sparkling brilliance of the sunshine; the white of the coral land, and

the exotic, tropical foliage, give a strangeness, a fairy-like character to the scene, a flavour which is unusual and fascinating.

But, *per contra*, as attractive as all of this sounds, there are conditions, some climatic, some not, but of importance, which must be taken account of, and which to a northern man—one from the latitude of New York—will be taken as *con* rather than *pro*. These may be summed up largely in the word "tropical" This is a tropical climate; and one living at a latitude of 40° is not inured to the climatic conditions that prevail at a latitude of 25°, even though he may live at sea-level and not be accustomed to the brace that comes with elevation.

A depression, an enervation, of body, often of mind, is apt to ensue, and one may wonder whether he may not have a touch of malaria. This is probably climatic, due to being so far south; so much more in the direct rays of the sun, and is a part of the soothing influence that goes with living in the tropics. If one runs away from the brace—the tonic influence of cold—he must not look for it in heat.

But these annoying conditions may be considerably mitigated by proper regulation, by attention to diet, to exercise, to clothing. It does not do to eat and drink as one may in a colder clime. The system does not require it, and evil consequences must invariably attend such a course. The amount of, and time for, exercise should also be regulated. In fact, there is a great indisposition to do anything; but this little is not to be done at mid-day. As regards clothing, this, of course, should be much lighter in texture, in colour, if not in material, than in the north.

The native black, who, as a rule, is a fine specimen of physical development, lives largely on fish, fruits, sugar-cane, peas or beans, and rice; he sits around a lot, happy as the

day is long, and does not seem to be constantly scheming for the morrow ; and as for clothing, it does not consist of much, and this little is light in colour, texture and material. A northern man might well take a lesson from him, for experience has taught him.

It does not do to adopt a northern appetite and a northern winter wardrobe in this southern clime. At the same time, one cannot readily change all his methods of life in a day : and it does seem as if a little more attention to details would enhance the pleasure of a stay in Nassau. If it is of importance to look after the *ingesta* of the body, it is also of importance to attend to the *egesta*. There is no sewer system here, and for the most part the privies are insufficient and inconvenient. If it is well not to be over-clad, one should not be under-clad. In a climate like this, where there is the great difference in temperature between the sun and the shade, where doors and windows are open, and where the skin is active, care must be taken not to catch cold ; for taking cold has its evil consequences, in aches and pains, here as elsewhere. Hence the advisability of having wraps handy and of avoiding draughts.

In regard to the diet, most of the things are brought from the mainland. Ice is manufactured at the hotel, while that used in town is imported from Maine. Meats are imported and many of the vegetables. But the returns from the tomatoes and lettuce grown here give suggestions of successful market-gardening, not confined to these vegetables. Milk—cow's milk—is to be had at 16 to 20 cents. a quart, but still it is to be had. The drinking water is, in many cases, rainwater, caught on the roofs and stored in cement cisterns. The well-water is full of lime and is hard.

With regard to exercise. There are somewhat rough and stony golf-links, and the roads are hard and well adapted to bicycling. These seem violent methods of exercise, though

they each have their advocates. But the temptation to sit on the piazza and look out on the beautiful blue and malachite of the sea and its wealth of shipping-life is strong and seductive.

The piazza-life, even into the evening, is a feature, but is often interfered with by the mosquitoes, especially if the wind is from the south, blowing across the island. There is an excellent library, an unusually well-assorted one, of 15,000 volumes, and a daily bulletin by cable. This cable makes a possible connection, though an expensive one, with the world. There is a charge of 36 cents a word, address and signature as well as the message, to New York, which is 11 cents more *per word* than from the latter place to London. This makes the adoption of some cable code advisable.

But a point of advantage, and yet one that has its limitations, is the accessibility. Distance and accessibility are not synonymous terms. For instance, Chicago and Savannah are about equidistant from New York. Are they equally accessible? So at Nassau; connection with the mainland is by steamers, which run at intervals, and may not run at all just when one most wants to get away; or the sea may be rough and the journey unpleasant; or sometimes the landing is to the south-west, eighteen miles away; all of which makes the thousand miles to New York seem very long. But on the whole, to one who enjoys sailing, the trip of three days and four nights is most enjoyable: and the experience of awakening from the cold of winter into the warmth of summer in a twinkle—as if by "presto-change!"—is a never-to-be-forgotten one.

The steamers are sea-worthy and comfortable. The hotel expensive, but commodious; the boarding-houses considerably less expensive, but not so convenient.

To sum up briefly, there exists at Nassau a summer climate

at mid-winter, an ocean climate on dry land, brilliant sunshine, pure air, inducements to living out of doors, at sea-level. But this same air, while equable in temperature, is hot, and it is moist.

I would not think of sending one here where a moist climate is contraindicated, as in early phthisis, nor where the tonic influence of cold is advisable. But where an out-of-door life at sea-level, a moist skin, an equable temperature, a pure air, sunshine, freedom from cold and snow, a dry soil are sought—as in certain forms of heart troubles, or of Bright's disease, or in diabetes, or neurasthenia, or insomnia, or in the case of persons who need to get away and take a rest, or even those who want to avoid the rigor of a northern winter—in all of these cases, and they comprise a large class, Nassau is worthy of consideration.*

The scene and the climate make this a desirable winter resort for a few weeks, picturesque and delightful. But then comes the factor of its being a tropical climate, with its enervation, which must weigh as a counterbalance to such enthusiasm. This gets in its work. Nassau is soothing, not bracing. It is an excellent objective point for tourist travel, and as a resort should be used largely for its soothing qualities and inactivity.

* S. G. W. Benjamin, in his charming book, "The Atlantic Islands," published in 1878, gives it as his opinion, based on extensive travel, that: "As a sanatorium for winter alone, they (the Bahamas) are beyond all question, superior to any other health resort on the Eastern Coast of North America."

IMPRESSIONS OF CALIFORNIA RESORTS.

BY GUY HINSDALE, A.M., M.D.
PHILADELPHIA.

THE extreme northern end of California is mountainous and to a large extent uninhabitable. Mount Shasta in its grandeur is the chief object of natural interest in this portion of the State. The Salmon, Scott and Siskyou mountains intersect the north-west corner, while in Modoc County in the north-east there are uninhabitable lava beds and numerous lakes. Throughout Siskyou, Lassen and Modoc Counties there are volcanic plains destitute of animal and vegetable life, formerly the inpenetrable retreat of Indians.

The interior valley at its northern extremity is narrow, lofty mountains hem it closely, and the climate is severe. At Yreka, in Siskyou County, the snow lasts until April, and throughout the upper valley spring opens considerably later than at points 100 miles further south. As an example of the climate in the northern part of California, near Mount Shasta, the following observations are characteristic (see table).

At Red Bluff 50 miles further south, the monthly mean temperatures were from 9° to 17° higher while the rainfall was 4 inches more. At Sacramento the seasons are extremely mild. The maximum in 1901 was 101, minimum 25, mean

for the year, 59·7; about that of Atlanta, Georgia. The rainfall was 18·52 inches.

YREKA. ELEVATION, 2,635 FEET

1901.	Precip.		Mean Temp.
January	8·12	...	27·2
February	2·86	...	35·0
March	·98	...	44·4
April	·40	...	47·5
May	·52	...	56·8
June	·00	...	60·5
July	·05	...	69·6
August	·95	...	72·2
September	1·24	...	59·6
October	1·28	...	55·2
November	1·81	...	45·0
December	3·09	...	56·0
Annual	21·30 in.	...	50·8

Maximum .....102° F.
Minimum..... 2° F.

San Francisco is colder than Sacramento in summer and warmer in winter. The maximum in 1901 did not reach 91°. It will be remembered that this was one of the hottest summers experienced in the eastern and central States. Only once in that year did the mercury fall as low as 37°. This remarkable uniformity in the climate is characteristic of the upper California seaports. Every afternoon in summer the citizens of San Francisco, now numbering over 350,000, are refreshed by the bracing cool breeze which sweeps in from the ocean. These ocean atmospheric currents rush inland as the air of the interior valleys and plains become heated by the sun. Wherever the coast barriers are broken down to the sea-level a gateway is opened for the ocean breeze, which surges towards the interior as water rushes through a mill-race. The hotter the day in the interior the stronger the wind, and the cooler the weather in San Francisco. Once inside the Golden Gate this air current spreads in all directions,

northward along the Sacramento and southward up the San Joaquin Valley, reaching far into the interior, tempering the air, and producing one of the most enjoyable features of the famous Californian weather.

However much those in robust health may relish these strong, refreshing summer breezes, it can hardly be urged that they are favourable to those having pulmonary disease. Some forms of chronic nervous disease are no doubt greatly benefited. In my visit to San Francisco last summer I was much gratified to meet a gentleman who had rapidly lost his health and strength from paralysis agitans, as I had observed it in Philadelphia, who assured me that the change of residence had saved his life. There is not the same watchfulness necessary regarding the use of various weights of clothing, the factors of climate not being such variable quantities as in the east.

At the approach of night the air of the interior is rapidly cooled by radiation, and the inward rush of ocean air is checked, until a perfect atmospheric equilibrium results. San Francisco, Santa Barbara, and Los Angeles may then become enveloped in mist. In the interior evening is accompanied by the descent of cool currents of air from the mountains. The daily maximum temperature steadily increases from the coast to the interior, until the mercury may rise to 126° F. in the shade, (Salinas, 1900) and to 160° to 170° in the sun. Professor J. D. Whitney has noted that as one leaves Sacramento and travels into the mountains it becomes perceptibly warmer, at least for the first 2,000 or 3,000 feet of ascent. Thus the mean temperature of Colfax (elevation 2,421 feet) was higher in 1900 by ·01 inch than that of Sacramento (elevation 71 feet). "As high up as 8,000 or 10,000 feet the days in summer are comfortably warm, and even on the high peaks of the Sierra, at 12,000 or 13,000 feet of altitude, at mid-day it is

usually so warm that an overcoat is not needed. At night, however, at these elevations it is almost always so cold that frost occurs, although occasionally it is very warm all night long, even at so great an altitude as 8,000 feet. It adds very much to the pleasure of travelling in the high Sierra that the weather is by day, almost all summer long, delightfully mild and clear, without rain: so that one of the greatest discomforts to which tourists are exposed in Switzerland and most other regions of pleasure travel are here entirely unknown."

In Oakland, one of the choice places of residence across the bay from San Francisco, about the same amount of rain falls as in that city; the mean monthly temperatures are from 5° to 10° higher, and the maxima are slightly higher in June and July, November and December, while the minima are higher in June and July, but less during the cold months. For fourteen years past the mean temperature has been 55·62°, the mean relative humidity 84·67, and the mean annual rainfall 24·51 inches. The rain falls during the late autumn and winter. The winter months are those of greater humidity, while the mornings in which the sky is overcast are chiefly from October to April inclusive.

We may say in passing that the situation of Leland Stanford Junior University, at Palo Alto, impressed us most favourably. It is a creation rather than a development; and what it lacks in time is amply made up in space. The broad ranches stretch as far as the eye can see, yielding the fruits of the earth with a generosity which must have an inspiring influence on that great body of students. We missed the classic shades of the New England campus, but we recognised a force at work which was rapidly creating the means to educate and cultivate the mind and body of a fine race of men. As one of the friends we met expressed it, "God has

sifted forty States to get the seeds to plant Southern California with men."

The San Joaquin Valley is over 300 miles long, and forms the widest and most attractive portion of the great central valley of California. It is the real garden of the State, and comprises 7,000,000 acres. Its chief cities are Stockton, Modesto, Merced, and Fresno. Comparing the San Joaquin with the Sacramento Valley, the chief climatic difference is the diminished rainfall. This falls at the head of the San Joaquin Valley to approximately 10 inches. The coast range of mountains at its highest point, Mound Diablo, rises to 4,440 feet, and effectually shuts out the rains and fogs of the coast. The Sierra Nevada range, on the east, is the source of snow-fed rivers which supply the valley with water. These mountain tops are much more humid than the valley, and condense the moisture found in the upper air currents; thus the additional rainfall of the mountains and the melting snow yield an unfailing supply of water. Irrigation is necessary for agriculture, and the fertile soil yields products of remarkable variety and abundance. On the higher peaks an enormous amount of snow falls, and railroads find it necessary to have long snow-sheds for the protection of trains. In the early history of the Central Pacific Railroad it was necessary to shovel away in one spring 60 feet of snow over seven miles of the line merely to get at the road bed. At Emigrant Gap (elevation 5,221 feet), and at Truckee (elevation 5,819 feet), and at Summit (elevation 7,017 feet), snow falls each season to the extent of 200 to 450 inches. At Idyllwild, Riverside County, Southern California, the snowfall for 1901 was 66 inches. Idyllwild is in the Strawberry Valley, at an elevation of 5,250 feet in the San Jacinto Mountains.

Travellers find in the San Joaquin Valley and its surroundings the most interesting scenery is California. The unrivalled

Yosemite Valley, the Big Tree groves, Tulare, Kern and Buena Vista Lakes, are full of attractions for the tourist and sportsman.*

The country north of the Mojave Desert is a desolate region, much of it below the sea-level, with a drainage—if such a term can be applied to it—towards the various sinks or half dry lakes. There is strong evidence that these remnants of lakes were formerly of grand dimensions, and are slowly disappearing for ever, leaving, as in the Death Valley, nothing but a mud flat in ordinary winters and a dry desert plain in summer. This valley is 150 feet below sea-level, and it would be difficult to conceive of a more forbidding region. The traditions of thirst, starvation and death which have given it the name, are in strong contrast with the perennial verdure and prosperity of the delightful coast resorts.

Death Valley forms a part of the northern margin of the Mojave Desert. It is about 75 miles long and is shut in by bold ridges of mountains, the Sierra Nevada range separating it from the Pacific slope. Its extraordinary depth, exceeding 100 feet below sea-level, its heat and dryness, and the melancholy fate of explorers who have perished from thirst within its limits, have invested it with so much interest that the Weather Bureau maintained a meteorological station in this valley during the five months of the summer of 1891. It is so arid that few plants and, among animals, only horned toads, lizards, and snakes are able to survive. The temperature in 1891 rose to 122° in the shade.

* "Geological Reports of California," by J. D. Whitney. "Yosemite Guide Book," by J. D. Whitney. Little, Brown and Co. "The Pacific Coast Scenic Tour," Finck. "Mountaineering in the Sierra Nevada," Clarence King. Reports of Prof. John Muir, State Geologist of California. "California of the South," Lindley and Widney. D. Appleton and Co. "Mineral Springs and Health Resorts of California," Winslow Anderson, M.D., San Francisco, 1892.

The average maximum for July and August was 115°. The relative humidity at 8 a.m. averaged 30 per cent., and at 8 p.m. 16 per cent. The air is not stagnant, but in unusually active motion, the heat being increased by occasional hot blasts from the south. Cloud-bursts not unfrequently occur. "They are small and concentrated storms of the utmost fury, which gather suddenly about the mountains in the hottest weather. An ominous cloud forms with great speed, grows black and full of lightning, sags down to the mountains, and releases a flood of water." Forty men were employed for five years in the borax works located in this valley, and they considered its climate healthy. The winter is cool and salubrious, with an inch or two of rainfall. The five months of summer are so hot and arid that men exposed to the heat of the sun's rays may not have unfrequently been driven insane.

In 1840 a large party of men made an attempt to reach California by a southern route through the Great American Desert, but became lost in Death Valley, being deceived by mirage and the shifting sands. Without water, and forced to eat even the hides of their animals, many died. After indescribable sufferings a few of these men, known as the "Jayhawkers," reached Santa Barbara. It is reported that one died of ecstasy over the mere taste of water.

The deserts, however, are of inestimable value to the coast. The intensely heated air of these unprotected plains and the more moderate heat of the interior valleys rise to the upper strata of the atmosphere and the cool air of the ocean rushes inland. Thus, as has been previously stated, the hotter the inland country the cooler the sea coast and the stronger the sea breeze. Were the plains covered with verdure and the surface greatly diversified the climate of the sea coast would not be what it is.

The Salinas Valley, extending south-east of Monterey, is the only channel between San Francisco and Los Angeles where the winds can sweep inland from the sea. This opening is about six miles wide and extends for one hundred miles back. Fogs are prevalent during the summer in the line of the north-westerly air current, but the coast below Point Conception is not subject to this wind, and fogs below that cape are not so common. Santa Cruz has in this respect some advantage over Monterey in its ocean exposure. The rainfall about Monterey Bay is greater than at more southernly points, and its efficacy is augmented by the fogs of the early morning. The temperature of Monterey Bay is such that out-of-door life is pleasant throughout the year. The mercury seldom rises above 80° F., and rarely falls to the freezing point. Slight frosts may occur in winter, but the days are warm. Records show that the temperature of the water taken off-shore at the depth of eight to ten feet between 9 and 11 a.m., was :—

	Jan.	Feb.	Mar.	Apl.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water	52·1	52·7	52·2	57·2	57·2	58·2	60·4	60·2	60·0	56·3	54·7	53·3
Air ...	54·4	54·9	52·2	58·6	59·2	60·2	61·8	63·0	61·3	63·0	52·8	53·2

Malaria is rare in this vicinity ; the soil is a sandy loam, and the water obtained from wells is soft and pure.

Monterey is admirably furnished with all the luxuries of a seashore resort. It is only 125 miles by rail from San Francisco, and is provided with a palatial hotel, the famous El Monte. With a superb beach, perfect roads, hills, valleys and ocean, nothing could be more delightful to a convalescent than to rest a while at this resort. It is eminently suited to those who need rest, relaxation from business and other cares, or who have been exhausted by chronic, nervous, or febrile disease. It is well suited for the relief of insomnia. Pulmonary tuberculosis is not favourably influenced here or

at Santa Cruz. A local report says, "I would not advise persons predisposed to, or in the first stages of, consumption to locate, even temporarily, in this valley. It seems that phthisis pulmonalis runs its course here more rapidly than anywhere I have noticed. I consider the climate in every stage of the disease unfavourable."

The better districts are those having from 1,500 to 2,000 feet of altitude. One ought to be above the fog line, and this may be placed at 1,000 feet. To be sure, the fogs are not so chilly as in the eastern states, and it is generally claimed that they are "dry" and "warm," not steamy. This is to a certain extent true, but at the best they are prejudicial to everything but the gardens, whose moisture is recruited in this way. It may also be said that as the fog is dissipated the sky comes out clearer and the air has that transparency that commonly follows storms.

Santa Cruz is a popular watering place, protected by mountains, with excellent walks and drives and a fine beach. All sewage is carried to the ocean, and the water supply is from mountain springs. Seven miles from Santa Cruz is a famous grove of "big trees," the *Sequoia sempervirens*, reached by a beautiful drive through the "Powder Mill Cañon."

Santa Barbara is more favourably situated. It is 40 miles east of Point Conception and 300 miles from San Francisco. The recent completion of the coast line of the Southern Pacific Railway brings Santa Barbara into easy communication with all the coast resorts from San Francisco southward. Santa Barbara is protected on the north by the Santa Inez range of mountains, and the shore-line runs almost east and west. The soil of the valley proper is alluvial. The hills and mountain sides are covered with a mixture of decomposed sand and clay. There is no prevalent wind. The northern air current which blows eight or nine months

in the year does not affect Santa Barbara, but passes from the mountain tops high above the city and strikes the ocean 10 or 15 miles from land. Usually a gentle breeze from the ocean, commencing about ten o'clock in the morning and a little earlier in summer, blows until sundown. There is usually a period of one or two hours, morning and evening, when the air is calm. There is some breeze at night, but since the mountains are so near the ocean there is not such a marked alternation of sea breeze by day and land breeze at night as prevails in many places. South-easterly winds bring rain in winter. In March, April and May the wind is highest; sudden gusts, however, are not frequent. The "northers," which are liable to occur in the interior of Southern California, are experienced in a modified degree on the coast. They occur late in the autumn, just before the rains, and particularly if the rains are delayed until December. They may occur in the early spring. These winds from the desert are desiccating in their effect, and last from one to three days. They are usually accompanied by a great deal of dust. The velocity of these winds may be twenty miles an hour. The recent practice of applying petroleum to the roads about the cities of Southern California has done much to mitigate the local dust; but it is impossible to check these whirlwinds from the plains.

At Santa Barbara the annual rainfall has been so low as 4·5 inches (1877-6), and as high as 35 inches (1889). The average is about 18 inches. No rainfall occurs as a rule between April and November, and seldom for twenty-four hours in succession. The mountain streams supply the purest water, and many of these streams sink in their channels so soon as the porous soil of the valley is reached.

The temperature of Santa Barbara is agreeably mild. Observations taken of the sea water show the following :—

	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Water	61	64	64	66	62	60	60
Air.....	68	69	61	72	70	69	65

During September and October the temperature of the water is about 5° higher than at Santa Cruz, and 12° higher than at San Francisco. At the latter point the water is about 52° F. all the year round. Santa Barbara is about 10° warmer than Santa Cruz during September and October. Many of the cottages here are occupied by people from the eastern and middle States during the winter and spring. The hotel accommodations are of a superior order. The Miradero Sanatorium is well spoken of, but does not receive tuberculous patients.

Our visit to Los Angeles, Pasadena, Redlands, and Riverside was full of interest, and was made the subject of a previous account to this Association. The visit to Idyllwild Sanatorium in the Strawberry Valley, to Loma Linda, and other admirable health stations are fresh in our memory. We learn that they are continuing their good work, and we received a stimulus from having known them.

NOTE. — Since our visit in 1902 Stanford University has had an alarming experience with typhoid fever. A brief account may be of interest. The most important point is that the origin of the trouble was accurately ascertained and corrected.

A dairy had been in operation about four miles from Palo Alto. It was leased last winter to a Portuguese family. Two of the three houses stand on a brook, from which a wooden channel conveys water to the trough in which the dairymen washed their cans and pails. The excretum from the houses was thrown out on the ground. Rain washed it into the brook, and some of the poison found its way to the trough.

A death from typhoid occurred in the dairyman's family in March, and about April 6 several cases of fever appeared in Palo Alto. Suspicion rested on the milk immediately, because the water of the town came from driven wells. Bacteriological examination showed bacilli in the milk, and on April 8 the authorities suspended the milk service. Already, however, the germs had been widely scattered. Within three weeks 159 cases developed, 80 of them being students in the University. Altogether 110 students were sick. Only four deaths were reported. At no time, it is asserted, was there any panic.

SOME FURTHER REMARKS AND QUERIES CONCERNING THE INFLUENCE OF ALTITUDE UPON HEART DISEASE.

BY R. H. BABCOCK, M.D.

CHICAGO.

At the New York meeting of this Association in 1899 I presented nine cases of cardiac disease upon which the effect of high altitude had been noted. In the consideration of the effect which had been exerted upon those cases, I advanced the theory that it was to be attributed to the acceleration of circulation incident, as I believed, to lowered atmospheric pressure. Among my conclusions was one to the effect that stenosis of the mitral and aortic orifices contraindicated, theoretically, at least, residence at a high altitude.

In his discussion of my paper Dr. Sewall very pertinently pointed out that he had under observation at that time a female with pure mitral constriction whom I had previously treated in Chicago and who was able to bear the altitude of Denver, apparently without ill effect. At Cripple Creek, which was more than twice as high as Denver, she was short of breath. Nevertheless, as Cripple Creek was hilly and the patient did considerable walking, it was presumable that her dyspnœa was owing, not so much to the altitude as to the fact of exercise at that height on uneven ground.

This observation was a contraindication of my assumption regarding the inability of patients with mitral narrowing to

endure elevated climates. During the past four years I have observed two other instances of pure and uncomplicated obstruction at the mitral orifice, both in females, who declare they feel far better in the mountains of Colorado than at Chicago. One of them suffers from asthmatic breathing at her Chicago home, whereas she is free from it in the Rockies. It is very possible, therefore, that her comfort in Colorado may be due to her immunity from her asthma, but one may ask is not this immunity due to some, as yet not understood, influence on her circulation? Moreover when in the mountains, even at a height of 10,000 feet she takes very little active exercise, whereas at home she does considerable walking. So that this fact must also be taken into consideration in its bearing on her greater comfort in Colorado.

The other lady, who likewise declares she feels well in the Rocky Mountains, experiences pronounced lassitude in Chicago, whilst in Colorado she feels stimulated and energetic. She does not remain especially inactive, therefore at that altitude, as does the former lady.

In marked contrast to these, are two other individuals whom I have recently observed. Neither has valvular disease, so far as can be determined. One is a lady of fifty-three, who suffered much from menorrhagia during a number of years at the time of the menopause and became anæmic, but did not, so far as could be learned, exhibit signs of cardiac inadequacy. Last summer she went to Colorado Springs to remain for a number of weeks, but at the end of forty-eight hours was so out of breath and oppressed as to be compelled to consult a physician. Dr. Swan saw her and, as she stated to me, found the action of the heart so disordered and the organ so dilated that he advised her immediate return home. His advice was acted upon and soon after reaching a lower level her symptoms disappeared.

Nevertheless a subsequent cardiac break-down occurred from just what cause could not be ascertained, but apparently in consequence of exertion, which although not in itself excessive, was yet relatively too great for her heart. It was because of two attacks of pulmonary œdema that I was asked to see her in consultation. The condition as I saw it, was a considerable degree of cardiac dilatation, especially of the right heart, with a strikingly small weak pulse, but without turgescence of the superficial veins, other than the external jugulars. It seemed as if the stasis was chiefly in the large distensible veins of the abdomen, including those of the liver.

The second case of this latter group is that of a man of thirty-eight, who has lived in Montana, at an altitude of four to six thousand feet for the past eighteen years, where he has been engaged in mining. The symptom for which he was sent to me was a dull præcordial pain which, together with rapid action of the heart, was noticed for the first time fifteen years ago, after he had done much climbing of ladders in the mines. His recovery from these symptoms was followed by an immunity lasting fifteen years. Last fall, however, his præcordial pain had returned about a week after a pretty stiff climb over the mountains. When I examined him for the first time, it was some weeks after he had been in Chicago, and my examination was not very fruitful. Nevertheless I came to the conclusion that there was a slight degree of cardiac dilatation and hence expressed the opinion that he had suffered a cardiac over-strain. Very recently he returned with the statement that upon going back home and resuming his active habits he had again felt the dull præcordial pain. He then left that altitude and upon reaching Missouri lost his annoying symptom. This time, it was quite apparent that the transverse diameter of the heart was much too great and that the right ventricle was dilated, as shown by percussion and an

epigastric pulsation. But the observation that chiefly interested me was his low arterial pressure. Blood-pressure, as registered by Gærtner's tonometer was 85 mm. of mercury, whereas normally it is between 100 and 130. The pulse-rate, even allowing for his nervousness, was much too rapid and the low blood pressure was further evinced by a feeble aortic second tone. The radials were only slightly stiff. I saw no reason in that fact, however, to conclude that there was sclerosis of the aorta and chronic myocarditis. I still look upon the condition as one of cardiac overstrain, incident to exertion at an altitude, and not to the altitude *per se*, since he must have become accustomed to the lowered atmospheric pressure after a residence of eighteen years.

Now before putting forth any queries or attempting to account for the effects in these four cases, let me briefly refer to a statement made to me by the late Dr. C. W. Purdy of Chicago, relative to the danger of high altitude in some cases of chronic interstitial nephritis. Purdy said he had known more than one patient with renal disease to develop alarming uræmic symptoms after a few days in Denver, although in Chicago their kidneys had been equal to the work put upon them. He had consequently come to believe a trip to the Rocky Mountains extremely hazardous for chronic nephritics.

With the foregoing briefly narrated facts before us, can any one offer an explanation of the differing effects experienced in the case given? Are they all explicable on the same hypothesis? For my part I frankly confess to being up a stump and yet I incline to the view that different factors were at work. Let us take the effects upon chronic nephritis first. In this disease there is high blood-pressure, which, however brought about, is nevertheless salutary since without it in the renal artery urinary excretion would lessen and dangerous symptoms would develop. Since at a high altitude blood-pressure is

diminished, are therefore uræmic symptoms to be attributed to a fall of arterial pressure? Or are we to look for these effects in an increase of metabolic activity in consequence of which the damaged kidneys become unequal to the demands put upon them? We cannot hold, I think, that the function of the skin is less active in the dry air of the mountains. On the contrary, although the skin feels dry, evaporation is really more active than in the damper atmosphere of lower regions, and if such is the case, then the work of the kidneys should be lessened. It seems to me that the explanation must be sought either in diminution of blood-pressure in the renal artery or in a more active metabolism. Can any of our Colorado friends tell us whether as a matter of fact the mean blood-pressure of individuals living at Denver or higher, is less than among residents of the plains? If not, a series of observations would be of great scientific interest and value. Since uræmic manifestations are said to be experienced soon after chronic nephritics reach that altitude, may it be, that dangerous symptoms occur because time has not been allowed for the circulatory system to adjust itself to the altered barometric conditions and that this fact, if a fact it is, acts in conjunction with increased metabolism. I confess I incline to this latter explanation and to lay more stress upon metabolism than upon alteration in blood-pressure. If such be the case, it does not help us to understand the cases narrated.

For instance, let us turn to the case of the miner who has resided at a more or less considerable elevation for the past eighteen years. His initial symptoms developed at Butte, Montana, at an altitude of 4,000 feet, after he had done much ladder climbing. They were tachycardia and præcordial pain. Then after their cessation followed a respite of fifteen years, when they recurred about a week after he had climbed a mountain on foot and for a part of the way carried a grip. The maximum altitude was 8,000 feet at this time.

Although his blood-pressure was low soon after his descent from the altitude of Montana to the low level of Missouri, I yet believe that in this instance his symptoms were a direct result of heart strain and not of the lowered atmospheric pressure *per se*. Cardiac strain appears to be easily induced in the rarified air of the mountains, but had this man not subjected his heart to strain, I believe the altitude itself would not have affected him, and in reality did not affect him. This case may be dismissed, therefore, except in so far as it bears on the subject of cardiac strain in the mountains.

Let us now turn to the middle aged woman who got up a dilatation of the right ventricle at the altitude of Colorado Springs. She is positive that she did not commit any conscious over-exertion, and yet she did not refrain from physical effort before becoming accustomed to the altitude. Was this also a condition of cardiac strain merely? If so, why did her heart quiet down upon reaching the plains?

I am at a loss to account for her experience, unless possibly upon the hypothesis that when she went to Colorado she had already had an abnormally low blood-pressure and that the injurious effects of habitually low arterial pressure were intensified in the light air of the mountains. Such an explanation seems to me not unreasonable and hence I should greatly like an expression of opinion on this point.

Granting, for the sake of argument, that habitually low blood-pressure was the cause of this woman's unfortunate experience, can it have any bearing upon my two cases of mitral stenosis? In the case of my patient with this form of disease whom Dr. Sewall observed, the sphygmograph had shown a small, tense, radial pulse. Now I believe that it is stated that some patients with mitral stenosis display a tense pulse of capillary origin the constriction of the capillaries being itself due to the state of the splanchnic nerves. If

such is the case, does it throw any light on the ability of some of these patients to endure and even improve at an altitude? Or did these patients feel better simply because they were less active than when at home?

Since this paper was begun I have seen another female with what I take to be a mitral narrowing with a patent foramen ovale of congenital origin, whose history is interesting in its relation to altitude in cardiopaths. Prior to six years ago she had not experienced symptoms of cardiac incompetence. At that time she visited in California, going into the mountains, where she indulged in much equestrian and other exercise without, she asserts, any discomfort. Upon going to San Francisco she promptly had a severe attack of what was thought to be asthma, but from her description appears to have been an acute pulmonary oedema. Since that time she has been subject to frequent recurrences of her so-called asthma in consequence, seemingly, of exertion, although other factors also appear to influence its production. Two years ago she was in Asheville, N.C., and there was able to ride horseback which she says she cannot do at Chicago.

The physical signs of her cardiac disease do not need to be stated, but it may be said that at the time of my first examination, her blood-pressure, as registered by Gaertner's tonometer, was 147 mm. of mercury. This was not very high and yet was higher than normal, which is from 100 to 130 mm. Such high arterial pressure was not maintained, however, for upon being given a cathartic and being put to bed it fell to 125 mm. of mercury.

Now what may we assume from this case? Was hers a condition of overstrain in the mountains which declared itself only after she reached sea-level? Or was she able to exercise in the Californian mountains and again in Asheville and not at sea-level, because she had habitually high blood-

pressure? and if so, why had she not experienced difficulty prior to her California mishap? Why can she ride in Asheville at an altitude of only 2,500 feet and not in Chicago? At first I inclined to the belief that an abnormally high arterial pressure had something to do with it. but now I incline to the view that her attacks of dyspnœa are of a mixed type. That is that although they appear to be a cardiac rather than a spasmodic asthma, there is in addition some other factor at work, which is not active in the mountains. It required a condition of cardiac overstrain to develop her asthmatic tendency and that having been once established other influences, whatever they may be, are now capable of initiating an attack. Like the other female she is well in the mountains or rather was well in Asheville simply because these factors were not active.

Are we to seek the explanation of one person's ability to endure altitude and another's inability to endure it in conditions of blood-pressure, or must we conclude that, as stated by Regnard, any one can reside at an altitude of a mile or so, after he has once become accustomed to it, *i.e.*, acclimatised?

It seems to me it would be well if our Colorado colleagues would make it a rule to record the blood-pressure in newcomers and especially those exhibiting signs of cardiac distress and compare these with observations made after the same persons had grown accustomed to the altitude. A consideration which seems to argue against a person's tolerance or intolerance of moderate altitude being due to the blood-pressure lies in the generally accepted statement that the pulse of the consumptive is one of low tension and yet most of such patients are able to endure residence in Colorado at an elevation of a mile without serious cardiac embarrassment. Is this observation correct, I should like to ask? If a certain number of tuberculous subjects experience cardiac discomfort

in Colorado, are they, I inquire, those in whom the pulse tension is noticeably low?

As already stated I am at sea in this matter and am growing to believe that if a cardiopath will remain inactive until accustomed to the altitude he can visit the mountains and journey to California with immunity from symptoms. The danger of travel and residence at an altitude appears to be really greater in the case of apparently healthy hearts, since such individuals are likely to over-do and therefore get up a condition of cardiac over-strain, and that in all cases it is not so much the altitude itself which is to be feared as it is the ease with which the heart may be overstrained in the mountains. This strain is itself not due so much to the altitude as it is to the fact that in the higher regions the surface of the ground is uneven and hilly. In short, given a rarified atmosphere, with hills to surmount, the heart becomes more easily overtaxed than at the sea-level and hence signs of cardiac embarrassment and even incompetence develop which would not appear at home.

A NOTE ON THE RELATION OF NEURALGIA TO ALTITUDE, WITH REPORT OF TWO CASES.

BY F. SAVARY PEARCE, M.D.
PHILADELPHIA.

THOUGH men of equal merit and located in various parts of the United States regard this subject in radically different ways, yet there must be a definite relation as cause and effect between pain, storms and altitude. Furthermore, barometric pressure must be the main factor influencing pain of so-called functional disease, as well as a modifying element of pain due to organic disease, as, for example, the root pain of ataxics.

This short contribution is made in order to record two cases, one of hystero-neurasthenia, and the other of neurasthenic-hypochondria; both patients suffering from intense facial neuralgia, but not so persistent as to warrant a diagnosis of tic douloureux in either case. The subsequent histories of both cases prove them to have been curable symptoms.

CASE I.—M. R., a hysterical girl, aged eighteen, has been suffering from intense facial neuralgia of the inferior branch of the fifth nerve for three years. The damp country up the Schuylkill Valley in Pennsylvania, where she had always lived, was a menace to the curing of the real pain which she had in the face—although she was a neurotic, it must be said. After trying a number of analgesic remedies with due caution, to their full limit, I made up my mind that change of altitude

to a dryer and warmer climate during the winter months would be the best remedial measure to institute. The patient was willing for any reasonable experimental measure in therapeutics.

We sent the young lady, accordingly, to Tryon, North Carolina, in a temperate climate at an altitude of 1,050 feet. The pain was eased from the day of her arrival in the South, where she subsequently made rapid improvement. The balmy atmosphere, which is here 10 degrees warmer than that in the vicinity of Asheville, North Carolina, much aided in relief of her pain, no doubt. When, however, she went to 2,500 feet above sea level at Hendersonville a month later, the patient became distinctly worse immediately, as to the neuralgia. I believe this excludes psychic effect in the case. After returning to Tryon, the original lower altitude of 1,050 feet, she has been delighted with her relief again from suffering; a few weeks later she seemed to be cured absolutely of her pain. A recent letter is confirmatory of her well-being now, six months since she left Pennsylvania.

Case 2.—Dr. S. L. W., aged sixty, was referred to me by Professor L. Webster Fox, who had found nothing in the eyes to account for headache of neuralgic type involving the supra-orbital branch on either side. This man had passed into a miserable, neurasthenic hypochondriacal state, the result of overwork and worry associated with the distress of a most persistent diurnal paroxysmal pain which at times amounted to acute agony. Doctor-like, he had used most of the remedies in the pharmacopœia on his own account. The first suggestion from me was to drop all medication, in order to see where we stood in the matter, although it should be stated that the physician was not taking medicine at the time he first came for treatment in January, 1902, the pain the while persisting as indicated above. This, with the

general neurasthenic condition of the man and the nature of his suffering, made for a diagnosis of supra-orbital neuralgia. I tried the mono-bromate of camphor in 3-grain doses every three hours when the paroxysms returned, with some betterment during the first few weeks of his visits. During this time, the general therapeutic *régime* was towards the upbuilding of his constitution, through abundance of milk and the avoidance of dietary indiscretions. There was no indication in the urine to show evidence of toxæmia, and the intestinal tract seemed to be in perfect function. We also administered the hypophosphites, and treated him with electricity down the spine thrice weekly with the idea of bettering his nervous tone. After these ministrations for six weeks, I found that while his general condition was better, the symptom pain still persisted. This man had tried the climate of Denver, and whilst there he said the pain was much more severe than when in Philadelphia, practically at the seashore level. The observations of this patient, who is a very intelligent man, made me again think over the problem of altitude as related to pain.

These two cases above recorded coming in close succession, and of the same disease distinctly made worse by sudden ascent (in the first case, 2,500 feet above sea level, and in the second case of a mile above sea level at Denver) were striking examples of reversed conditions of pain I had noted in a previous paper, wherein the pain of tabes was noted to be bettered by high altitudes.* The thought has come to me in explanation of this matter, that in essential neuralgia, so-called, as these two cases are, a sudden lowering of atmospheric pressure

* "A Study of the Diagnosis, Etiology, and Treatment of Tabes Dorsalis, with Special Reference to Precocious Locomotor Ataxia and the Argyll-Robertson Symptom."—*Therapeutic Gazette*, October 15, 1898.

produces a congestion of the superficial facial tissues, and therefore irritation of the peripheral supersensitive sensory neurons in the patients. Any sudden reduction of atmospheric pressure would, therefore, through such engorgement *per se*, and also, no doubt, through the retention of waste products within the blood pabulum, cause an irritation which would be harmful in neuralgia. In the cases of posterior sclerosis to which we have referred, where the pain was bettered by this same reduction of atmospheric pressure through altitude, it would seem to the writer to be explained by the fact of the reduction of pressure upon the surface of the body relieving in consequence the congestion about the nerve roots, which is the partial cause of the pain in tabetics.

The subsequent histories of the two patients recorded above show that they are distinctly better of the neuralgia at the present date, both as to severity and as to prolonged intervals of attack. In both cases, too, Philadelphia and vicinity was not a good climate for them ; the young lady being very well indeed at the low altitude in North Carolina, the physician, from whom I received a letter recently, being greatly benefited by a sojourn to St. Louis, Missouri.

There are other considerations of meteorological nature which undoubtedly must be brought into account in studying pain. We believe that careful scientific observations of this subject in the future taken upon a large scale in various parts of the country, will be productive of great good, for we feel confident that there is much to be learned in such careful observation of climatology of disease.

Dr. S. Weir Mitchell, the pioneer in the study of the relation of pain to storm centres, had continued his studies in a recent contribution before the College of Physicians of Philadelphia* (May 6, 1903), and finds that with the advent of storm con-

* The Relation of Headache to Storm Conditions.

ditions, which imply lower barometric pressure, headaches are aggravated. This observer also notes on a carefully prepared chart that chorea is likewise more prevalent during the same atmospheric state, *i.e.*, one of lowered air pressure.

Some observations we made for Dr. Mitchell, which are recorded in his "Clinical Lessons," also bear out the idea that no doubt increase of blood pressure from any cause will excite or increase pain when it is due originally to pressure from force behind (*vis a tergo*), producing superficial sensory disturbance; for in the cases of erythromelalgia recorded there as indicated, when the limb was pendant, the pain was excited immediately, and there was a rise of the superficial temperature of the foot affected. The whole subject is one of intense interest to medicine, and to the patient sufferers from disease

THE SYPHILITIC AFFECTIONS OF THE HEART AND AORTA.

BY LEONARD WEBER, M.D.
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Mr. President and Gentlemen,—It was in 1895 that I had the honour of reading a paper on "Syphilis as a Factor in Diseases of the Heart and Lungs" before this Association. The literature of syphilis of the heart has grown very considerably since that time, and there have been so many publications of carefully observed cases that there is no further doubt among the well informed as to the frequency of its occurrence in the later stages of syphilis. When Fournier and Erb, in the seventies of the last century, called the attention of the profession to the frequency of the disease of the nervous system attributable to the toxins of syphilis, their observations were soon corroborated by other clinicians, and it was not more than ten years thereafter that this highly important knowledge became the common property of not only the neurologist, but the general practitioner as well. Thanks to the labours of Virchow, Heubner, and many others, we have learned and are now convinced of the fact that syphilis may be counted as rather frequent among the various causes of arterial degeneration, in the form of sclerotic and gummatous processes, leading to endarteritis obliterans, with its baneful influence upon the nutrition of the parts supplied by the diseased vessel. Forty years ago this was not

known, and the heart, of all organs, was looked upon as practically exempt from syphilis. Now we are recognising that sclerosis of the coronary arteries, softening and degeneration of the cardiac muscle, observed in persons under fifty, are often of syphilitic origin ; and it will not be long, I believe, before physicians in general will admit syphilis of the heart is not infrequently seen in persons who have or have had syphilis.

In considering the etiology and general pathology of cardiac syphilis, the first question which would present itself is this : Is there a predisposition on the part of certain luetic patients, so that they are more apt to develop cardiac syphilis than others ? In a paper read before the New York Academy of Medicine, published in the *New York Medical Record*, April 5, 1884, on " Syphilis and Locomotor Ataxia," by which the discussion of the interesting subject was started and kept up for a number of years in various medical societies in the country, I showed that of 125 cases of syphilis treated by me, and observed for a period of from fifteen to twenty-five years, there were but two which presented marked symptoms of specific disease of the brain (hemiplegia) and died of it, and that these were two men who for one reason or another could not be convinced that they had syphilis, and unfortunately abandoned treatment during the first year of observation. Not one of the whole number had tabes. It is much the same, probably, with cardiac syphilis. In the first place, then, a light case of syphilis, overlooked, not treated at all perhaps ; or an ordinary case of syphilis treated in a perfunctory way, or not long enough, or when properly treated, becoming mixed up with alcoholism, is apt to develop nerve or visceral syphilis in the course of time, sometimes not until many years after infection. Again, it is a matter of frequent observation, and I have notes of some cases confirming this, that by the neurotic taint, inherited or acquired by prolonged masturba-

tion, or excess in venery, alcoholism, unusual physical stress and exposure, the syphilitic is predisposed to specific and degenerative changes of the nervous system: but similar influences may not as regularly produce similar results with reference to cardiac syphilis, and it will be shown by the history of a few cases that the vigorous has as little guarantee against coronary sclerosis and its baleful sequelæ as the feebly constituted syphilitic. Gout and lead poisoning may run alongside with syphilis, producing their own lesions without influencing that disease in the direction of arterio-sclerosis in any noteworthy way. There is, for instance, the case of M. C., 54), with hereditary gout, a free liver, vigorous, married rather too soon after acquiring syphilis, wife died some years ago, showing signs of contamination; his son had hereditary syphilis. Now this man has had many attacks of gout in the last twelve years, during which he has remained free of all specific symptoms, but heart and arterial system do not yet give any appreciable sign of disease.

Whether there is any particular occupation predisposing the infected to specific heart disease more than any other, I cannot say, but will mention that the two most marked cases of specific disease of heart and aorta which have been seen by me, concerned shoemakers, the younger of whom died suddenly the other day, while the older man is still alive, and much improved by treatment.

It has been stated that in the course of tabes dorsalis, aortic insufficiency is occasionally seen to develop. That is true, but not in the sense that posterior sclerosis produces the disease, but that it is caused by the syphilitic virus so often associated with tabes. Having carefully watched the development of aortic disease, including valves in old syphilis, and without the presence of any other marked influences, I am convinced of the correctness of the above statement.

I also believe that I am able to show now a casual connection between the syphilitic toxins and certain cases of chronic diffuse and interstitial nephritis dependent upon arterio-capillary sclerosis of the kidney.

What do we find at the autopsy of a syphilitic heart or aorta? At the outset, let me repeat what I said in a paper on this subject, read before the New York Academy of Medicine, March 9, 1899, and published in the *New York Post-Graduate Journal*, May, 1899: "Excepting the gumma in the cardiac muscle or cardiac arteries, there is nothing in the appearance of the sclerotic changes of the vessels, nor in the softening and degeneration of muscular fibres that would enable us to distinguish the arterial sclerosis of syphilis from that made by other diseases." And it is even so with "Pulmonary Syphilis in the Adult," *vide* the excellent monograph under that title by Drs. Th. E. Satterthwaite and W. H. Porter, published in the *Boston Medical and Surgical Journal*, June 11 and 18, 1891, wherein it is shown that the white pneumonia s.o. alone presents specific appearances. Read the essays on cardiac syphilis by Mracek, *Archiv für Dermatologie und Syphilis*, 1893, vol. xxv., Is.; Adler's observations on cardiac syphilis (*New York Medical Journal*, October 22, 1898): and on arterio-sclerosis in the *New York Medical Record*; and another paper by the reader on arterio-sclerosis and chronic nephritis in the *New York Post-Graduate Journal*, April 15, 1898; and so on down to Professor Runeberg's recent *résumé* of the subject in *Deutsche Med. Woch.*, 1903, Nos. 1 and 2, and you will find that at a time when neither the aorta nor the main trunks of the coronary arteries exhibit any signs of disease, endarteritic and periarteritic processes may be developed in and about the smaller vessels of the heart, leading to structural changes later on.

The case develops further, and we notice atheromatous patches in the aorta, pulmonary and coronary arteries; under the microscope, endo- and periarteritis and interstitial myocarditis pretty well advanced. In another case, again, with the symptoms of enlargement, weakness and arythmia of heart and dyspnœa during life, the dilated heart will show areas of softening (myomalacia) in the myocardium, streaks and patches of fibrous growth replacing muscular fibres; occasionally also a gummatous tumour. Again, when the symptoms have been those of angina pectoris alone, coarse lesions of the main trunk of the coronary artery only may be found after the sudden death of the sufferer. I may mention here the unusual case of a man, aged 45, who died some time ago of acute pulmonary œdema during an attack of ordinary bronchial catarrh in midsummer. He had had syphilis some twenty years before that, and the autopsy revealed extensive atheroma of the pulmonary artery extending way out into the ramifications of the vessel.

Through obliterating endo- and periarteritis, distension of capillaries and smaller veins occurs sometimes, and in addition thereto small hæmorrhages take place, the extravasated blood forcing the muscular fibres apart and breaking them into fragments, as shown first by Ehrlich. To be sure, hæmorrhagic infarction is not the usual way in which myocardic tissue is destroyed, but it is through deficient blood supply that the fibres undergo atrophy and molecular disintegration, and that scar tissue is formed in their place by simple cellular infiltration; and replacement of numerous muscular elements by fibrous tissue means *permanent impairment of vital function*. This has an important clinical bearing, for it is evident that proper therapeutic measures may arrest further developments of morbid cell-proliferation and gummatous growths and produce absorption, but are powerless

against fully-developed fibrous tissue. The fact, then, is now established that, wherever structural lesions are found in the cardiac muscle, due to syphilis, there also typical alterations in the blood-vessels can be made out: and there is good reason to believe that myocarditis and subsequent degeneration are secondary to the vascular lesions.

Diagnosis.—In the absence of syphilitic stigmata in a given case, it will be almost impossible to arrive at a correct diagnosis at an early stage of the disease. The differential diagnosis will also be difficult, particularly when the patient is unwilling or unable to give a satisfactory history of previous luetic disease. By careful attention to details in our examination, and *ex juvantibus* when other means fail, we shall not infrequently make the diagnosis of syphilitic lesions pretty certain.

Leaving the purely senile heart, which has a literature of its own, out of consideration altogether in this paper, it is evident that in endo- and myocarditis from rheumatism, in the alcoholic, the nicotine, the fatty, the gouty heart, syphilis may, as a rule, be excluded, though it may occasionally complicate one or the other of these forms of heart disease. The signs of myocarditis in individuals below fifty, such as weak impulse, with accentuated second sound, a rhythmic action, tachycardia, or even bradycardia, faintness, dyspnœa on exertion, angina pectoris, general depression and weakness, should always arouse our suspicion of syphilis, whether the patient admits a previous infection or denies it. In the absence of any other satisfactory etiology, we are justified to assume syphilis, and try to arrive at a correct diagnosis by specific treatment. The signs of active syphilitic lesions in other parts of the body in a case of myocarditis would go far towards making the diagnosis certain. The treatment may fail to cure, as it will in a case of advanced fibrous degenera-

tion : that does not disprove the syphilitic nature of the case : it may be too far advanced to yield to treatment.

Dr. Semola contends that arythmia and tachycardia, without other functional disturbances, not clearly to be accounted for on other grounds, and not yielding to the ordinary treatment with digitalis or other cardiac remedies, are pathognomonic of cardiac syphilis ; and he reports a number of such cases cured by iodide and mercury, after other treatment had failed.

The clinical and anatomical material is as yet insufficient to decide to what extent his views are borne out by actual fact. However, Isaac Adler, Wm. Thompson, and myself reported such cases to the New York Academy of Medicine in 1898 and 1899.

Quite a number of cases of sclero-gummatous disease of the coronary arteries manifest themselves mainly by the symptoms of angina pectoris. Professor Runeberg, of Helsingfors, states that a case of this kind, going on without cardiac hypertrophy and other symptoms of general arterio-sclerosis, occurring in a patient under fifty, is of specific origin—at least eight times out of ten. When not relieved by proper treatment, sudden death during an attack is not a rare event.

Next to specific sclerosis of the coronary arteries in frequency and practical importance must be placed syphilitic aortitis, with its sequelæ, degeneration of the semilunar valves, and aneurismatic dilatation. These affections of the aorta will be associated with cardiac hypertrophy and muscular degeneration also, particularly so where the valves are much diseased. Two very good examples of this kind I shall mention later on. The anatomical lesions found here are rather gross, and generally more readily recognisable as specific sclero-gummatous processes than those of the coronary

arteries. Other influences being excluded, the differential diagnosis is more readily made when the aortic disease concerns a person under fifty years of age, just as we know now that the majority of cases of aortic aneurism present a previous luetic history. Of my own records of about a dozen cases of aortic aneurism, syphilis had been present in ten of these. Circumscribed gummata in the cardiac muscle are but rarely observed in comparison with arterio-sclerosis and myocardic degeneration. Where far-advanced, obliterating arteritis is disclosed at the autopsy of a syphilitic heart, so that a small size knitting needle only can be pushed along a coronary artery, and we know that, nevertheless, the patient had but few symptoms during life indicating serious cardiac lesions until he rather suddenly succumbed to a fatal attack, we can readily understand that a patient in the early stage of specific coronary sclerosis may present no symptoms whatever to indicate the presence of a dangerous disease. And is it not even so in renal sclerosis and in endarteritis obliterans generally ?

In the great majority of cases which have so far come under my observation, I have had pretty well-marked signs of cardiac disease before me ; but the heart can get along pretty well through its blood supply, and muscular force may be reduced ; and, provided we succeed in arresting further progress, and cure by specific treatment what may yet be curable, the prognosis is not so bad as it looks at first sight. Old cases may not be cured, but they can be readily improved, if they respond to treatment. I remember but one case concerning a young man with well-marked constitutional syphilis of recent date, with febris continua syphilitica, enlarged spleen, marked anæmia, and endo-myocarditis, who got entirely well after mercurial inunctions, followed by the iodides and tonics, and has remained so these last four years. But

this was a case of specific cardiac disease in the early stage, and in a young person.

To rely upon the iodides alone in the treatment of syphilitic heart disease will lead to disappointment, according to my experience: temporary improvement, often very good, you may get, but it will soon pass away. Not so, however, if mercury be used with them, or even without them, provided the patient's kidneys are sound. Then and then only will good and even permanent results be obtained in treating cardiac syphilis. For this purpose I have been in the habit of ordering mercurial inunctions whenever practicable; when not, the bichloride of mercury hypodermically, or the biniodide by the mouth. Advanced cases of syphilitic aortitis I have found less amenable to treatment than specific cardiac disease. The general nutrition of such patients is almost always much impaired, and the various specifics are not well borne.

Finally, permit me to give you the history of four rather interesting cases:—

Case 1.—Alb. M., 67, father and mother lived to a good old age, and had always been well. Though a free liver and smoker, he was never ill until he contracted syphilis in 1877. He was carefully and sufficiently treated, and kept under observation for six years. There have been no relapses or manifestations of tertiary lues. He remained quite well and active until October of last year, when he noticed his breath getting short on slight exertion, his sleep disturbed and uncertain, and his throat and trachea often filled with catarrhal secretions. The superficial dulness of heart occupied a somewhat increased area, impulse diffuse and weak, first sound poor, followed quickly by accentuated second sound, heart pause shortened, arythmic, no murmurs. Marked sclerosis of radials, no angina symptoms. There

seemed to be no doubt about the presence of chronic myocarditis having reached a stage at which the cardiac functions began to show serious disturbance. The question arose, was it all due to old syphilis, or also—perhaps even more so—to arterio-sclerosis of advanced age, and the influence of liquor and tobacco? Tentatively, mixed treatment was ordered and carried out for four weeks, and an evening dose of digitalis was given; but the heart dimensions remained the same, the subjective symptoms improved but little. In December he experienced an acute attack of gastro-intestinal indigestion after eating some too rich or spoiled food. The patient had high fever for three days, on recovery felt very weak, and had lost all appetite; presently he became dropsical, the water increasing with alarming rapidity, filling his legs, abdomen, and appearing in the pleural cavity, and the urinary secretion dwindled down to 15 ounces in twenty-four hours. He had lost all appetite, was somnolent, without being able to sleep; had, in fact, all symptoms of venous back pressure caused by rather acute dilatation of the right half of an already damaged heart. Specific treatment, calomel, strychnia, and moderate doses of fluid ext. digitalis failing utterly to afford relief, I said to myself: Leave all previous history out of consideration, and treat the case as one of acute incompensation, such as we observe sometimes in mitral regurgitation, when the right heart becomes over-distended. Of an infusion of the best English leaves of digitalis (ex. ʒss.), ʒvi., liq. potass. citrat, ʒi., tinct. columbo ʒss., he began to take a tablespoonful every three hours on a Wednesday (noon), and in the night from Friday to Saturday he passed of urine 90 ounces. The re-established and increased diuresis kept right on, and after finishing a second bottle of the same mixture in the course of the next five days my patient was not only safe, but practically well enough to go

about. To this day, four and a half months having passed, he has been able to attend to business regularly; his pulse, though good enough, continues arythmic, and his heart needs careful supervision, because it is, and will remain, the seat of chronic myocardic weakness and degeneration.

Case 2.—Ad. M., aged 68, married, father of healthy children, stout and active man; have known him these forty years. He never had any of the usual signs of syphilis, and would never admit he had it if I told him so to-day; but, fortunately for his welfare, I noticed a well-marked superficial serpiginous spyhilide over sternum about thirty-five years ago, when I happened to examine his chest. Eight years ago he came to me with well-marked symptoms of general neurasthenia, sense of heaviness and fatigue, somnolence, &c., patellar reflexes greatly reduced, pupils almost inactive, slight Romberg present. By a systematic course of hydrotherapy and rather perfunctory mixed treatment, repeated at appropriate intervals, he improved greatly, and had no occasion for further medication until three years ago, when he came back and complained of dyspnœa, fulness in epigastrium, loss of appetite, weakness, &c., &c. Finding the heart enlarged in all dimensions, arythmic, small, jerky, fast pulse, and a greatly enlarged liver, he was first put on calomel for the purpose of unloading viscera; this was done once a week for four weeks, with very beneficial results in all respects. After that he took mixed treatment in moderate doses for fifteen days out of every month, and continued this for one year. His liver returned to almost normal dimensions, cardiac dulness much reduced, the progress of chronic myocarditis has been stopped, but, to be sure, no cure is to be expected. Digitalis has not been used in this case, though I tried it—and about a year ago—to reduce the size of enlarged heart, but without any

success whatever. Of great assistance in this and like cases are occasional purges by calomel or elaterium, to relieve passive congestion, and help thereby the action of such specific and other drugs as may be indicated.

Case 3.—Mark M., aged 63, married, shoemaker, had syphilis between his twentieth and thirtieth years, which soon became latent. Fifteen years ago he suffered from suppurating muscular gumma in the leg, which I scraped thoroughly with a sharp spoon. Under iodoform dressing and mixed treatment perfect healing took place. Last winter he came back, complaining of cardiac symptoms. Heart somewhat enlarged, first aortic murmurish, ascending aorta dilated, slight angina symptoms, probably due to some coronary sclerosis and myocardiac degeneration. Cardiac pulse weak, pulse arythmic, some œdema of lower extremities, slight albuminuria. By a course of iodide of potassium, strychnia, and nitroglycerin, rapid amelioration of all symptoms was obtained, œdema and albuminuria disappeared, and patient is in fairly good condition at the present time.

Case 4.—Joseph K., aged 37, married, shoemaker, father of healthy children, had syphilis when he was twenty-two, but knew of no more specific symptoms after twenty-five until about two years ago, when he was taken with severe neuralgia in left side along the course of about the seventh intercostal nerve. At various dispensaries and in hospitals also he received treatment. When he appeared at my clinic last October he was thin, pale, and worn, complaining of above pain mainly, and was in generally poor condition. By the fluoroscope the physical diagnosis of dilatation of heart and aorta was confirmed, there was muffled first aortic sound of aorta, and an almost filiform pulse at left radial. Sacculated aneurism of descending thoracic or arch of aorta could be excluded after repeated examinations, and the

diagnosis confined to sclero-gummatous disease of ascending aorta, and associated with disease of coronaries and myocardium and syphilitic periostitis, and neuritis concerning left seventh rib and intercostal nerve near the spine. After a carefully conducted course of mercurial inunctions plus iodide of potass., his pains left him, and patient was able to work again at his trade, which he had not done for two years. During the summer he was put on tonics, and he kept on doing well until December of last year, when his heart became weak again, general nutrition suffered, his intercostal pain returned, and angina pectoris symptoms occurred. Some improvement was had again after the iodides and cardiac tonics; but in March of this year the patient died rather suddenly during an attack of angina pectoris.

THE ROLE OF LOCAL SANATORIA IN PREVENTING THE SPREAD OF TUBERCULOSIS.

BY DE LANCEY ROCHESTER, M.D.
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I think it is safe to say that at the present time it is the opinion of the medical profession that the best results in the treatment of pulmonary tuberculosis have been obtained in sanatoria devoted to the exclusive treatment of the disease. This being so, it follows that if a case is sent to a sanatorium and is cured while in the sanatorium during the existence of the disease, it is no longer a focus for spreading the disease, and of course, after cure, it remains in the same harmless condition.

Unfortunately, even with our present possibilities for early diagnosis, cases often come under observation so late that they are beyond cure, and consequently, in spite of instruction, are often a constant menace to their fellow beings.

Under the circumstances, it seems clear that great good could be accomplished by the establishment in every community of two sanatoria, one for advanced and one for incipient cases of pulmonary tuberculosis; and by the enactment of an ordinance that every case of pulmonary tuberculosis which could not be accommodated with an airy room to be occupied by himself alone, and otherwise properly cared for at home, should be compelled to go to one or the other sanatorium, according to rules for commitment which could be established by each community.

Two sanatoria are advocated for two reasons: first, because the treatment of the two classes of cases is decidedly different, and secondly, because the constant presence of advanced cases and the occasional painful death of one or more, have a decidedly depressing influence upon incipient cases. That this is a real influence for the bad I have had demonstrated on several occasions in a mixed institution with which I have been connected for several years. Only last winter two cases that were regularly and steadily improving in all respects took sudden and decided change for the worse after distressing deaths of other patients in an advanced stage of the disease.

If every case of pulmonary tuberculosis were reported to the health department as it should be, the department could send an inspector and determine whether such a case is one for home or sanatorium treatment. Of course, every case should be allowed the privilege of sanatorium treatment, if he so desire, even though his circumstances were such that he could be cared for at home.

The health authorities are granted the right to separate cases of smallpox and certain other infectious diseases from their friends and families. The same right should be accorded them with regard to the greatest destroyer of them all—tuberculosis.

After removal of the patient, the bedding, clothing, and apartments of the patients should be thoroughly disinfected and cleaned. In this way, many foci for the distribution of the disease would be destroyed.

In the sanatorium, the patient would of course be under strict medical supervision, so that slight disturbances of temperature and other indications of increase in virulency of the disease—even though slight—would be noted early, and thence there would be afforded a much better chance

for the arrest of progress by the prompt establishment of proper therapeutic procedure than if the patient were at home under only occasional medical observation. In this way, the chances for the patient's recovery are doubled at least, and he is no longer allowed to remain a source of danger to his fellows. Moreover, in the sanatorium he learns, through observation as well as instruction, how to care for his sputum, and the very great value of this simple procedure. Through his visits to his friends and their visits to him, this knowledge would become much more widespread than by all the books and public lectures put together. Daily observation of the thing done acts as a clinical lecture, leaving a vivid impression much more lasting than that produced by the best of didactic instruction.

I know it will be urged that many consumptives are able to attend to business and aid in the support of themselves and their families. To this it may be replied that it will be much less expensive to quit work for six months, or even for eighteen months, and get well, than to continue doing rather poor work for a few months or a year and then leave for all time. Moreover, sanatorium life need not interfere with business if the patient really is in condition to attend to business; but it will interfere when it is best for himself and his companions that it should do so. This is, in truth, no hardship, but ultimately a gain for all.

It may be urged that it is an unnecessary hardship to compel a patient to die in an institution, excluding him from the privilege of passing his last days in the bosom of his family. To a very limited degree this is true; but in tuberculosis the end is seldom sudden, and the members of the family can be notified and allowed to be present at such a time. In the case of other great plagues the isolation is more complete and the friends are not allowed to be present, even at the last.

So the procedure is not unprecedented, and the good to come to the entire race from such sequestration kept up persistently for ten or fifteen years would far outweigh the slight psychical disturbance of a few.

The bodies of all dead from tuberculosis should, of course, be cremated.

Instruction in regard to destruction of sputum and fæces, in regard to precautions as to personal contact with others, and in regard to disinfection of apartments lately occupied by consumptives, are all of value in checking the spread of this disease ; but it is the opinion of the writer that some such plan as has been outlined, of compulsory reporting of cases and compulsory removal of suitable cases to their proper sanatoria will be much more efficacious than all the other procedures in ridding us of the great white plague.

SUBSEQUENT HISTORIES OF SEVENTY-NINE ARRESTED CASES OF PHTHISIS TREATED AT THE SHARON SANITARIUM, FROM 1891 TO 1902.

BY VINCENT Y. BOWDITCH, M.D.

BOSTON, MASS.

MR. PRESIDENT AND MEMBERS OF THE AMERICAN CLIMATOLOGICAL ASSOCIATION.—Four years ago, at our meeting in New York, I had the pleasure of giving to you the subsequent histories of thirty-four "arrested" cases of pulmonary disease treated at the Sharon Sanitarium from 1891 up to 1899.* I will not apologise for bringing up the subject again, for I feel sure you will agree with me that it is the after histories of such cases which prove the efficacy or otherwise of methods which are now so prominently before the public.

Let me again cite the fact that the results which I place before you have been *obtained in a climate thought to be most unfavourable for consumptives, not far from the sea coast, and at the insignificant altitude of between* 200 *and* 300 *feet only above sea level.* In these latter particulars the Sharon Sanitarium was for several years unique. During recent years, Dr. Millett's Sanatorium at East Bridgewater has been built with similar conditions, although it is intended for patients

* "Subsequent Histories of Arrested Cases of Phthisis treated at the Sharon Sanitarium," *Boston Medical and Surgical Journal*, June 22, 1899. *Transactions American Climatological Association*, 1899.

who are of a more well to do class than those at Sharon, where only patients of limited means are received. The State Sanatorium at Rutland, opened in 1898, has an elevation of 1,100 feet, and is fifty miles from the sea.

Again, let me remind you, moreover, of my use up to the present time of the term "arrested," which has included all those cases in which abnormal outward symptoms have disappeared, many of them having justified the more favourable terms used by some authorities, "apparently cured," or "cured," at the time of discharge.

Since my last paper, the institution has been enlarged from the capacity of nine to twenty-one beds.

The total number of cases discharged since the opening of the institution in February, 1891, up to April 1, 1902, is 182. Five of these remained but a few days, and were not under treatment, and thirteen were cases of asthma or simple bronchitis, therefore eighteen are not considered in the results.

In tabulating the remaining 164 cases which are considered, I have allowed a year to elapse since the last one of the number was discharged.

Seventy-nine of these 164 cases were recorded as "arrested," a percentage of 48·17 of all the phthisical cases.

Of these seventy-nine cases, which include those mentioned in my report of four years ago, twelve, or 15·2 per cent. have died since leaving the institution, after varying intervals of comparative health.

In my previous report, six out of the thirty-four "arrested" cases had died. In that paper, I gave the probable reasons for the relapse, and explained that in one the cause of death was from shock during some uterine operation, no trace of previous pulmonary disease having been noticed by the attending physician previous to the patient's death. In the other five, a return to unhygienic surroundings had brought

about a relapse in patients who had upon entrance marked symptoms of disease varying in extent and severity, and in whom any arrest of disease was thought at the time to be improbable.

Since that time, two more of those then reported (18 and 27 of the following list) have died, both of them having had well marked disease in one or both lungs before entrance, and in whom the arrest was a remarkable proof of the efficacy of sanatorium treatment. One of these returned to a life of drudgery, with four small children and no servant to assist her. She remained very well for two years at least, but finally broke down and died five years after discharge. The other, all of whose family had died of phthisis, remained in excellent health, without any abnormal symptoms, in spite of hard work in Boston and in Florida for three years. After marriage she broke down again. Her cough returned. She again entered the Sanitarium, where her cough again ceased completely for several months; but in consequence of a severe cold last autumn she had another relapse, failed rapidly, and died this winter in Florida.

The histories of the remaining four of the twelve who have died are significant. Only one (45) was what can be called an "incipient" case, with râles at one apex, complicated with severe mitral disease, which rendered the treatment more difficult. An arrest of the cough and expectoration was accomplished, but upon return to a damp, unhealthy house, the patient relapsed, rapidly failed, and died not long afterwards. Two others (51 and 62) had well marked symptoms in both lungs, but remained two or three months in the Sanitarium without cough or other abnormal symptom, and for months after discharge were in excellent health. For reasons not fully explained, however, both these cases suddenly developed serious symptoms again, and died one and two

years after leaving the Sanitarium. The remaining case (61) had far advanced disease in one lung. After a stay of four and three-quarter months at Sharon, she left without any abnormal outward symptom, looking perfectly well, and remained so for several months; but a return to objectionable methods of life in the city brought on a relapse, and she died in 1902.

Of the remaining sixty-seven "arrested" cases, excellent accounts are received, with only one or two exceptions, the former having sent no report at all of recent years. She was known to be feeling well at last accounts. The latter, a case of fairly well marked disease, has failed in strength, and doubtless will sooner or later succumb to the disease. The majority write enthusiastically of their good health, some of them having left the Sanitarium ten years ago. All are employed in their homes or in occupations which as a rule allow them to be out of doors more than before.

It would be impossible, of course, to give each case in detail to you here. A tabulation will be made with the published paper whereby one may judge fairly well for himself of the results claimed. For the preparation of these tables I am greatly indebted to Dr. Walter A. Griffin, the resident physician at the Sanitarium.

I am aware that some of the cases could be possibly challenged from the fact that the presence of bacilli could not be proved, and because the tuberculin test had not been tried. In answer I can but say that only those cases have been taken which experience teaches us usually develop later more definite signs of disease under unfavourable conditions. I wish it were in my power to bring before you some of these patients, now apparently well, who were in the Sanitarium formerly. Their presence and aspect would speak more eloquently to you than my mere statements of what can be

done. I must content myself, however, by citing a single case as an example.

One woman (H. Q.), a domestic, was sent to Sharon from the Massachusetts General Hospital out-patient department in 1893, with bacilli in her sputa, and having evidences of trouble in the right lung. She had previously been told by a physician in Ireland that she had consumption, and could not live. After a stay of fourteen months, she left the institution, a magnificent specimen of health, her cough having ceased several months before. She has remained perfectly well since (nine years), having been actively employed as a domestic in Boston and the suburbs, and lately wrote that she was never better in her life. I could cite several other cases which differ only in minor details; but this will serve as an example of what can be done *not far from home in a changeable, harsh climate, at an altitude not far above sea level.*

In citing these cases I do not wish to be misunderstood. I have never been one of those who believe, because of the success of sanatorium treatment in a large percentage of cases in a climate like that of New England, that it is therefore unnecessary for anyone to seek another climate. I believe, as I have stated elsewhere, that in more salubrious climates better results can be obtained by this method than with us; but for the hundreds and thousands of sufferers who for various reasons cannot go far from home, institutions like Sharon, Rutland, and that of Dr. Millet at East Bridgewater are of inestimable value. I claim, moreover, after twelve years' observation, that it has been shown that it is not always necessary to send people far away in order to get well.

To keep the subsequent histories of sanatorium patients before us is therefore of ever increasing interest, for by doing

so we learn the true value of what may have been of the nature of an experiment at the outset.

What may we learn by studying these cases?

Not only that more can be done near our homes by these methods than has been thought possible in former years, but that a large percentage of patients in whom the disease is arrested can remain well under ordinary conditions of life, especially if attention is paid to proper methods of hygiene. On the contrary, we learn that a return to unhealthful conditions is in the majority of cases usually, although not always, followed by relapse and fatal results.

It is made more evident, too, which has been often said, but it cannot be said too often, that in order to obtain the best results, patients should be placed under treatment during the earliest possible manifestations of trouble, notwithstanding the fact that in many cases of well marked disease success has been attained.

In this paper I have confined myself solely to the histories of "arrested" cases, and have said nothing of the large percentage of those who have so much improved that they have become wage earners again, and a comfort to their families, even though they may not have wholly recovered their health. Neither have I touched upon the educational influence which such institutions have upon the community—a fact which I believe to be of as great importance as the benefit to the individuals themselves who enter for treatment. These points must be left, however, for other times and places.

As to methods of treatment and details of management at Sharon, they cannot be enlarged upon here. Suffice it to say they are what are employed in all well-regulated sanatoria of this nature. It may be said, however, that within the past three years the fresh air treatment has been pushed to its utmost limit, even in the coldest weather, the results being even more satisfactory than in the earlier years of the

Sanitarium. Elsewhere I have touched upon this special point.*

In conclusion, let me say that it is my belief that these methods will be found to be efficacious in all forms of tuberculosis, whether of medical or surgical nature. Surgeons are already seriously discussing the wisdom of fresh air treatment in tubercular joint disease, and if we reason by analogy, I see no reasonable ground for doubt that such cases will find it at least an adjunct as powerful for recovery as it is in pulmonary disease.

DISCUSSION.

Dr. E. O. Otis : I would like to emphasise the exceeding value of such statistics and such a paper as has just been presented to us by Dr. Bowditch. It is one of the most difficult things to obtain the subsequent histories of consumptive patients, and here we have the histories of such patients extending over a period of ten years. Sanatorium treatment, with a few exceptions, is so new in this country, that there are very few statistics from such institutions that have as yet been presented to us. Dr. Trudeau, as you know, has published, in conjunction with Dr. Baldwin, similar statistics, and I believe that Drs. Fisk and Solly have also done the same from cases in their private practice, but extending over what length of time I do not now recall. But I think the thanks of this Society are due most emphatically to Dr. Bowditch for the immense amount of labour which the collecting of these subsequent histories has entailed. They are most valuable evidence, as bearing on the sanatorium treatment of pulmonary tuberculosis. I wish physicians practising in health resorts would present more frequently than they do statistics of a similar nature.

The President (Norman Bridge, M.D., Los Angeles) : I am sure that we are all under great obligations to Dr. Bowditch for the paper he has just presented. His work has added facts to our knowledge which, as Dr. Otis says, we have long been seeking for.

* "Origin and Growth of Sanatoria for Tuberculosis in Massachusetts," *Journal of Tuberculosis*, vol. v., No. 2, April, 1903.

DISPENSARIES FOR TUBERCULOSIS, WITH A DESCRIPTION OF THE TUBERCULOSIS DEPARTMENT OF THE BOSTON DISPENSARY.

BY EDWARD O. OTIS, M.D.
BOSTON.

In Germany, France, Belgium, England, and Portugal, dispensaries or polyclinics for ambulatory cases of tuberculosis already exist; and in London, Manchester, and Edinburgh such institutions have been in operation for many years in connection with the consumptive hospitals in those cities. Prof. Fränkel, of Berlin, in the *Zeitschrift für Tuberculose und Heilstattenwesen*, Band II., Heft. 2, 1901, p. 101, after describing the quite extensive one in Berlin, mentions others established, either independently or as part of a general polyclinic, in Kiel, Greifswald, Marburg, Halle, Bonn, Breslau, Stettin and Wiesbaden. At the British Congress for Tuberculosis, held in London in 1901, Dr. A. Calmette, of Lille, France, gave an extended account of the "Émile Roux" Anti-Tubercular Dispensary, which was opened in February, 1901, and refers to others as already established or in process of organisation in France. At the recent International Tuberculosis Conference held in Berlin, October, 1902, under the section of polyclinics and dispensaries, Dr. Lancastre, of Lisbon, presented a paper upon the value of dispensaries in the struggle against tuberculosis, the inference being that he conducted such a dispensary in Lisbon. Bogaert also describes such a dispensary at Antwerp ("Tuberculosis," Vol. i., No. 2).

The value of such institutions in the large cities, particularly in the manufacturing ones, whether independent or as special department of a general dispensary or out-patient department, is, I think, quite obvious, in view of the present activity in the control and relief of pulmonary tuberculosis. There is, however, so far as I am aware, surprisingly few of them in this country. For the most part the custom has been to receive ambulatory tuberculous or suspected tuberculous patients in the general medical clinics of the dispensaries, where, of necessity, they received only the small amount of time and attention that could be accorded to any one patient of a large clinic : and also in proportion to the interest of the physician who happened to be on duty in this class of cases. Consequently, such patients must frequently, at least, fail of receiving that careful consideration in regard to diagnosis—including a bacteriological examination of the sputum, tuberculin injection, and X-ray examination when necessary for the diagnosis-treatment, and proper instruction as to the safe disposal of the sputum requisite in such cases. It is doubtless true, as Biggs says ("Sanitary Measures for the Prevention of Tuberculosis in New York City and their Results," by Hermann M. Biggs, M.D., of New York ; *Journal of the American Medical Association*, December 27, 1902), that many cases escape detection on account of the inefficient examination given patients, and that incipient tuberculosis is frequently not diagnosticated in dispensaries. Moreover the majority of tuberculous individuals must, if treated at all, be treated at home. Consumptive hospitals and sanatoria can, at the best, receive only a small proportion of the great army of sufferers from this disease. Still further, one of the most valuable and efficient means of prevention is the supervision and control of the consumptive at his home, and

instruction as to how he can avoid communicating his disease to other members of his household.

Such clinics also offer valuable material for research and investigation, as well as for instruction in diagnosis. It is evident, then, that the scope of such a special clinic for tuberculosis is almost unbounded, limited only by the facilities at the command of the physician and his own enthusiasm ; but as the physicians are presumably selected for their especial interest in this department of medicine, this latter ought to be great. There is but one objection that I have met with to such a special department in a dispensary, and that is the disinclination of those in charge of general medical clinics and who give clinical instruction, to part with a class of patients valuable for teaching auscultation and percussion and physical diagnosis. This objection, however, I think can—partially at least—be obviated by lending suitable patients of the tubercular clinic to the general medical men for purposes of instruction ; at least, this can be done when all the various clinics, as is generally the case in this country, are under one roof.

The Boston Dispensary, where the department about to be described has its habitat, is a venerable institution of over a hundred years' existence, established and maintained by private endowment. It is situated in a thickly settled portion of the city, surrounded by tenement houses and small shops, and in close proximity to one of the great thoroughfares of the city. It draws its clientage from all over greater Boston and beyond ; and the average daily attendance is from 250 to 300, not infrequently reaching a maximum of 475 or 500. All the special departments of medicine and surgery are represented there, even to a clinic for mental diseases. There is this advantage, at least, in having the tubercular clinic in the same building with the other special departments : patients

can be referred from other clinics to yours, and in turn you can easily and at once obtain an examination of the throat, ear, eye, or any other organ, when desired.

After careful consideration and some opposition, the tuberculosis clinic was established as an experiment in 1899, and at first held a session only two or three days in the week ; later its growth demanded a daily one. The whole number of positive cases of tuberculosis treated during the last year was 275. Although it has since enlarged its scope and name to diseases of the lungs, its prime interest and attention has always been consecrated to tuberculosis. The change was made, for one reason, in order to facilitate the differentiation of patients by the admitting clerk, and for teaching purposes ; for if, for example, a patient presented himself complaining of a cough, it was impossible to say off-hand whether it was due to bronchitis or tuberculosis.

The clinic is held every forenoon at the same time as the others in the building, and lasts from two to three hours. The physician in charge has a number of assistants, young physicians or medical students, who take histories, examine sputum, and aid in other ways preparatory to the examination by the attending physician. A careful history of the patient is taken on cards, like the one here exhibited, which are subsequently catalogued and filed for future reference. The pulse, temperature and respiration are noted, together with the present weight in comparison with the normal. All patients are then stripped to the waist, and a careful physical examination is made according to the usual methods. The sputum is then and there examined, when it can be obtained, by an assistant whose especial duty this is. A water spirometer is also at hand for obtaining the vital capacity of the lungs, although this is not done as a routine practice for lack of time. If the diagnosis is in doubt the tuberculin test is used, for it

has been found that this test can be successfully applied with ambulatory patients. There is also an X-ray room in the same building, and this aid to diagnosis can also be used.

At Calmette's dispensary at Lille the following is the plan of medical examination :—

(1) Chest measurements, in circumference.

(2) Weight.

(3) Expectoration ; nature and quantity of the sputum ; presence or absence of bacilli ; presence of microbes.

(4) Register of physical signs in the lungs by graphic method.

(5) Examination of the circulatory functions ; examination of the digestive, renal, and cutaneous functions.

(6) Examination of the larynx if it seems necessary.

At the end of a month another examination is made.

If the diagnosis is established at the first examination—which of course is not always possible—the name and address of the patient is given to one of the "district" nurses for investigation of the home conditions—sanitary, &c., personal, social, and financial, according to a list of questions furnished the nurse, and primarily modelled after Calmette's form of inquiry, a copy of which is herewith presented. By way of explanation, I will say that the Boston Dispensary divides the city into districts, and sends a physician daily, one for each district, to all cases of sickness among those too poor to pay a physician and who are unable to visit the dispensary. Accompanying each district physician is a trained nurse, furnished by another charitable association called the "Instructive District Nursing Association," and it is this nurse who makes the investigation above referred to, visiting the consumptives residing in her district. If proper and sufficient food cannot be obtained by the consumptive himself, arrangements are made with a "diet kitchen," or otherwise, to supply it.

To each patient a short one-page circular of advice is given, written in plain language, telling of the danger from the sputum and how to avoid it, together with simple rules of personal and domiciliary hygiene. Whatever drugs are prescribed are obtained from the Dispensary pharmacy at the uniform price of ten cents, or if the patient is unable to pay this, the medicine is given outright.

[Circular.]

Boston Dispensary.

Suggestions for the Guidance of Consumptive Patients.

(1) The sputum (spit) coughed up by a consumptive contains the seeds of the disease. If the sputum becomes dry and powdered, these seeds or germs fly about in the air, and anyone breathing them into the lungs is liable to contract consumption, especially if the general health is poor. If the sputum is swallowed it may produce consumption of the bowels.

(2) Never spit upon the floor, carpet, wall, stove, or street. When out of doors, spit into a piece of cloth, which must be burned as soon as you reach home. If you have to use a handkerchief, change it frequently, and boil it five minutes before washing. When in the house use a cup or hand spittoon half-full of water, and empty the contents down the water closet twice a day, or burn them. Wash the cup or spittoon thoroughly with boiling water.

(3) Do not get the sputum upon the clothing, bed-clothes, or hands.

(4) When you cough hold a cloth before your mouth. Do not talk or laugh in the face of anyone, for germs may be thrown out in this way. Do not kiss people.

(5) Keep your room well aired and clean, without any carpet on the floor, or stuffed furniture. Sleep alone, and in

a separate room if possible. Keep the windows open day and night.

(6) Keep yourself perfectly clean. Wash the face and hands several times a day, and rinse out the mouth. If possible, take a cool sponge bath every morning.

(7) Do not use any form of alcoholic drink, but drink all the milk you can.

(8) Do not get over-tired. Stay out in the open air several hours every day, even if it is not very pleasant weather; for fresh air and good nourishing food are the best remedies for consumption.

(9) Be hopeful, and make up your mind that you will get well, as so many thousand consumptives have done; but you must do what your doctor tells you, and have courage, patience, and endurance, for it takes a long time to get thoroughly well.

(10) Consumptive mothers should not nurse their children, and should not themselves use the children's feeding bottles, cups, spoons, &c.

(11) Any room which has been occupied by a consumptive patient should be thoroughly cleansed before being used again.

If the case is an incipient one, or appears to offer favourable chances of recovery under sanatorium treatment, it is referred to the examiners of the State Consumptive Hospital at Rutland, who have an office in Boston. If accepted, we endeavour to aid in securing the four dollars per week required for residence there. This amount does not indicate the actual expense, which is something more than double that sum, but the remainder is paid by the State. If the sum required of the patient (four dollars) cannot be obtained by him or his friends, the State or city, in a limited number of cases, will pay it, and in others the "Associated Charities" or other

charitable institutions come to the rescue. In other cases failing to obtain this amount from any source, we do the best we can with the patient at home.

If the disease is too far advanced for the Rutland Sanatorium, and yet the condition appears to offer some hope of an arrest, we not infrequently succeed in obtaining, by private appeal, the means to send such a case to one of the numerous extra-mural little sanatoria or boarding houses which have sprung up at Rutland about the great Sanatorium, and which are generally maintained by a graduate of the institution. Essentially the same treatment is carried out at these places, and the expense is very moderate. I have met with very gratifying results from a residence in such houses. A young woman, for example, with far advanced disease, after living thus for about a year and a half, lost all cough and expectoration, and has now for a year or more been self supporting. Another is well and conducting a boarding house at Sharon, while a third is married and—economically, at least—well. A few cases we were enabled to send South or West through the instrumentality of a charitable association called the "Invalids' Aid Society," whose object is to send patients to more favourable climates. Other cases—and they were in the majority—we treated at home.

In the city of Boston, notification of pulmonary tuberculosis is compulsory, and the efficient Board of Health do valuable work in inspection, instruction, and disinfection, and, so far as the accommodations at one of the city pauper hospitals permit, remove dangerous consumptives to it. We can also send a few hopeless cases to the several small private consumptive homes in the city. There is urgent need, however, here, as in all large cities, of a large consumptive hospital for such unfortunate cases.

Another service which we render at our clinic is the

examination, when desired, of patients who have been discharged from the Rutland Sanatorium, or who return after taking the open-air cure elsewhere. Thus, as Calmette says, the dispensary precedes and completes the sanatorium.

As to the equipment, administration, and objects of a tuberculous dispensary I shall speak directly, but I may be pardoned perhaps if for a moment I advert to a few random observations from our experience. First, one may obtain no evidence whatever from a physical examination that any disease exists in the lungs, and yet the sputum may show abundant tubercle bacilli. On the contrary, one may find quite sufficient evidence from the physical examination that tuberculosis, even beyond the first stage, exists, and obtain no tubercle bacilli in the sputum. Again, the X-ray frequently shows a greater extent of disease than is indicated by the physical examination. Râles at the apices are not always dependable signs ; they are there, and they are not, and often, like the Arab, fold their tents and quietly steal away : they must be fortified by other corroborative evidence. By carefully observing the act of inspiration, the diseased apex can often be detected at once by the lessened expansion on that side. Vocal fremitis is very frequently more pronounced over the right apex, even when there is very considerable infiltration at the left apex. When the temperature is normal, the pulse rate below eighty, and the respiration but little if any above normal, the presumption is strong that no tuberculosis exists. The subjective symptom of night sweats may be misleading ; patients often complain of it when, from the other symptoms, it is probable that this sign, as we understand it, does not exist.

And finally, I have experienced more genuine and expressed gratitude from my poor consumptive patients than from any other class. " Honey is not sweeter in your mouths, and

light is not more pleasant to your eyes, and music to your ears, and a warm, cosy bed is not more welcome to your wearied legs and head, than is the honest, deep gratitude of the poor to the young doctor," says good doctor John Brown, and I can add, " to the old doctor as well."

As to the material equipment and arrangement of a tuberculosis dispensary, that depends upon the means at command. I use a portion of a large general waiting hall for my waiting room, and one large room for examinations, using booths made of screens in lieu of special examining rooms. The sputum is also examined in the same room. Three days in the week we have the use of two small adjoining rooms. We can have from four to six patients in the process of examination at one time. In Berlin the clinic is held in a building especially devoted to its uses. On the first floor are various rooms for the reception and examination of patients, and in the second story are laboratories for the examination of sputum, animal experimentation, and bacteriological research. At Lille, the Anti-tubercular Dispensary consists of a building erected especially for the purpose, divided into six rooms : a waiting room, two consulting or examining rooms, a dark room for laryngoscopic examinations, a laboratory, which can also be used for a third consulting room, and an office for the visitor who visits and investigates the patients at their homes. In the annexe there is a laundry for the sterilisation and cleansing of the patients' linen, which is brought there in boxes. Pocket and table spittoons and antiseptics are furnished free. The Lille Dispensary also furnishes food to the poorest patients, and sometimes fuel and bedding. The Dispensary of Montmartre at Paris consists of a large waiting hall, an examination room, one for inhalations and respiratory gymnastics, another for X-ray examinations, and a dressing room.

Calmette, the founder of the Lille Dispensary, considers the altruistic motive the impelling one in the establishment of such institutions, for their chief mission, he says, should consist in searching out and attracting the working people attacked with or suspected of tuberculosis, by means of propaganda disseminated intelligibly in populous centres; in affording free consultation and advice for their family, in distributing free among them spittoons and antiseptics, and, as frequently as possible, gifts—food, meat and milk.

The equipment of the Berlin Dispensary, with its several laboratories, might indicate that the scientific motive was the primary one, characteristic of this people; but Fränkel (*Munchener Medicinische Wochenschrift*, 1900, vol. xlvii., p. 686) gives as the chief objects of such dispensaries: first and foremost, to make an early diagnosis, and facilitate the sending of patients to a sanatorium; second, when this cannot be accomplished, to treat the patients at home; third, prophylaxis, by teaching the patients to avoid communicating the disease through the sputum and drop infection. In the struggle against tuberculosis, he continues, the sanatoria form the regular line of battle, and the polyclinics the irregular or skirmish line, acting as a support to the regular line of battle.

It has been my experience that we do get a considerable number of early cases in such dispensaries, and although I should hardly agree with Fränkel that their *chief* object is the early detection of tuberculosis, it is at the same time a very important one. If I were to formulate the objects of the tuberculosis dispensary according to my own conception and experience, they would be somewhat as follows:—

(*a*) As complete an investigation of the patient as possible, including history, physical and bacteriological examination.

(*b*) Investigation of the patient and his *entourage* at his home, including the hygienic conditions of his domicile.

(*c*) Instruction, both of the patient and his household, in hygiene and the safe disposal of the sputum.

(*d*) The free supply to poor patients of pocket and house spittoons.

(*e*) Securing entrance into sanatoria for curable cases, and into consumptive hospitals for incurable ones, who cannot be properly cared for at home, and, when neither is possible, treating the patient at home.

(*f*) Aiding poor patients to obtain suitable food and other articles necessary for their proper care.

(*g*) Affording an opportunity to physicians to send their poor patients for diagnosis when desired, as well as advice and assistance in treatment.

(*h*) Opportunity for the scientific study and investigation of tuberculosis.

(*i*) Clinical instruction to students and physicians in the examination of tuberculous patients.

The equipment of such a dispensary should consist of a separate waiting room, a receiving or consulting room, where histories are taken, together with the pulse, temperature, respiration, and weight, several small examining rooms, a small laboratory for the examination of the sputum and other bacteriological investigations; a dark room for laryngoscopic examinations, unless a throat department exists in the same building; and possibly an X-ray room. These rooms should be well ventilated and periodically disinfected. There should be a staff of four chief physicians, each serving three months or more, with plenty of assistants, either young physicians or third or fourth year medical students.

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DISCUSSION.

Dr. LEONARD WEBER (New York): An effort should be made in all of the large cities, and particularly in New York, to equip dispensaries with every facility for the early diagnosis and treatment of tuberculosis in its incipiency; that this object would be best obtained in the manner brought before us by Dr. Otis' paper. In this way the morbidity of the disease can be just as much, if not even better, reduced, and even permanent cures made; not that I mean that the sanatorium treatment is in any way inferior to home treatment, by no means, but the point I wish to make is that a great many cases of early tuberculosis of the lungs, if diagnosticated and taken in time and given the home treatment which they ought to have, could be put in such a condition of improvement that they would not need the sanatorium treatment.

Almost as important as this matter is the establishment of tuber-

culosis hospitals in the large cities. We shall only succeed I think, in reducing the frequency of the disease more than we have already done when we segregate the advanced cases of the disease, not by sending them to sanatoria, but by establishing in the large cities tuberculosis hospitals for advanced cases. We shall also, in this way, have it in our power to reduce the morbidity of the disease in general by reducing the danger of infection, and if we are as successful as Dr. Otis has been in conducting the particular department of which he has spoken, in all our large cities, I have no doubt that it will be a great boon, and one of the means, and a most important means, of diminishing this most fatal of diseases.

Dr. Delancey Rochester (Buffalo): I have been very much interested in Dr. Otis' statement regarding the dispensary treatment for pulmonary tuberculosis in Boston, for I made a very bad failure of an attempt to establish such a thing at home. The men who were in charge of the general medical clinic simply would not stand for a clinic for tuberculosis alone, and we had great difficulty, in fact we absolutely failed in establishing such a clinic. I see that, according to Dr. Otis' statement, he has enlarged his clinic for one of the diseases of the lungs in order to finally accomplish the purpose.

One question I want to ask him: He says he has had no difficulty in using the tuberculin test in incipient cases. I have been in the habit of having the temperature taken every two hours for twenty-four hours before and for forty-eight hours after the injections of the tuberculin in these patients. I should like a little instruction as to how he uses the test in dispensary cases, so as to be sure of his reaction. I agree with him perfectly that the home treatment for cases of tuberculosis is the best if it be properly carried out, but I do still hold the position that I maintained before the session yesterday that two classes of sanatoria, one for the advanced and one for the incipient cases, would be of the greatest value and of the greatest aid possible in the prevention and treatment of the disease; and I think that every case of tuberculosis that cannot be properly cared for at home should be committed to one or the other of such establishments, both for his own good and for that of the public in general.

Dr. Judson Daland (Philadelphia): I wish to express my appreciation of Dr. Otis' paper, and to thank him for bringing out so thoroughly the uses to which a special dispensary service for this disease may be put, and more especially for his suggestions regarding the care of the patients so far as food is concerned. If we could put aside sufficient money for proper equipments, those cases that cannot go to sanatoria could be kept under close supervision and I am perfectly certain that an enormous amount of good can

be accomplished, not only in the betterment of the individual who is already ill, but also in administering to those around and about him. The practical difficulty that we all encounter in the outdoor treatment of tuberculosis is that these cases do require a great deal of time, but they also deserve a great deal of time in order to secure the best results. They not only require a great deal of time and study, which it is difficult to accord each case in a general clinic, but the element of ignorance which is so commonly present makes it almost impossible to carry out the treatment successfully under ordinary circumstances. I think, too, that the point brought out with reference to the necessity for frequent visits to our ambulatory cases is a matter of very great importance. I think that if all of the large institutions would establish a separate clinic for cases of tuberculosis much better results would be accomplished.

Dr. Arnold C. Klebs (Chicago): Referring to the clear exposition of the subject of dispensaries for this treatment, the importance of such institutions cannot be enough emphasised, because it has become, at the present date, the sanatorium from which we expect everything. No doubt the sanatorium treatment is eminently efficacious, but sanatoria are limited, and we cannot possibly put all of our patients in them. The great importance of the dispensary is in the relief of the family of the tuberculous patient, and I want to tell you about what we are doing in Chicago in that direction. We have combined in one Association—the Association is not formed yet, only the committee—under the auspices of the Visiting Nurses' Association, and have appointed a committee of forty, sixteen of which are members of the medical profession. It is the purpose of this Association to establish at various points in the city stations which shall each be in charge of a physician and a visiting nurse, and which shall be under the control of one central office, which shall serve as a sort of an information bureau. It is the purpose of this association not only to dispense medical advice and drugs, but also to furnish more material aid, such as the distribution of money if necessary, and the procurement of employment in the open air. When information reaches the bureau of a case of tuberculosis in a certain family, a visiting nurse will be sent to the home of the patient, or, if the case warrants it, the Association will endeavour to place the patient at some outdoor work, on a farm, &c. We shall be very much interested in the work of the Boston Dispensary, and will, I am sure, learn a great deal from it.

Dr. Frederick I. Knight (Boston): Referring to the advent of the district nurse, I desire to state that anyone who has visited the homes of the poor people since the introduction of the visiting nurse will agree in feeling that their visits to the homes of these

patients is going to bring about great good. Certainly the transformation that this nurse makes when she visits one of these families is something marvellous. Just from a few weeks of such attendance I have seen families transformed from the most filthy to the most cleanly. Dr. Otis has failed, perhaps from the fact that it does not exactly belong, in the subject of dispensaries, to mention the fact that in Boston we have recently organised one of those associations spoken of by Dr. Klebs for the relief and control of pulmonary tuberculosis, of which Dr. Otis has been made President. It has for one of its objects to visit and reform the homes of the people who cannot be transferred to a sanatorium where they belong, and I think that if all the large cities had such an Association a great stride would be made in the diminution of the prevalence of this disease.

Dr. J. Edward Stubbert (New York City): Referring to the subject of the visiting nurse and the home treatment of tuberculosis, I do not think that too much emphasis can be placed upon the necessity for this work. When we consider that 93 per cent. of the tuberculous of New York city alone either do not or cannot avail themselves of the proper treatment, and that only 7 per cent. have the advantage of climatic changes or sanatorium treatment, we have before us a problem which will never be solved by State or private sanatoria. State sanatoria are so mixed up with politics that they are slow in building, and even after completion it is doubtful whether they reach the class of people who are most in need of treatment. Dispensaries reach the incipient cases. A man with a large family depending on him will not enter a sanatorium, but he will go to a dispensary where he can be treated without giving up his work. One of the most important factors in connection with dispensary work is the proper nourishment of the patients. One dispensary in New York aims to fill the patients full of good nutritious food, such as eggs, milk, &c. Therefore I think that it is important to establish in all of the large cities dispensaries and hospitals where patients in the incipient stage of pulmonary tuberculosis may receive proper attention.

Dr. C. E. Quimby: Ten years ago I entered a plea before this Association for the home treatment of pulmonary tuberculosis, and took the position that such treatment was the only proper method for its eventual restriction. I wish to renew that position to-day. Two years ago I took the position before this Association that State or charitable sanatoria for the care of the tuberculous poor favour the breeding of tubercular subjects, and eventually increase the number of such cases. I wish to renew that position to-day. To-day I wish to congratulate Dr. Otis and those who have instituted the system of district nurses that they have initiated a campaign for the *prevention* of pulmonary tuberculosis.

Dr. E. O. Otis (Boston): Replying to the discussion and questions with reference to his paper, states that in using the tuberculin test the injections are made in the usual way, the patient being provided with a thermometer for taking temperature at stated intervals, &c. (Question by Dr. Rochester, Buffalo).

Dr. Otis here read further details with reference to the points discussed, and referred to his article upon the subject in vols. xv. and xvii. of the Transactions of the Association.

TENT LIFE FOR CONSUMPTIVES.

BY J. EDWARD STUBBERT, M.D.
NEW YORK.

THE results obtained from the climatic treatment of pulmonary tuberculosis have been most encouraging to the medical profession, but not sufficiently so for them to be satisfied with ordering a few weeks' residence for the patient at some popular health resort, accompanied by instructions to remain out of doors several hours a day in favourable weather. The march of progress in the world of medicine is a constant and irresistible movement. Old ideas and theories, based on supposition and belief, must give way to the new and more scientific knowledge founded on pathological study and experimental research. This is illustrated in one way by the history of the evolution in the treatment of tuberculosis. In ancient times it was highly improper to expose a tuberculous patient, especially one beyond the first stage, to a breath of fresh air except on the mildest days in summer, while the night air was dreaded and avoided as the plague, Then the more observant and thoughtful men noticed that those who lived more in the open air did not die as quickly as the hot house patients, and they began to urge an outdoor life and moderate exercise as a prophylactic, as well as a cure for those in the early stages of consumption. Those in the more advanced stages were allowed fresh air only when it was at summer temperature; but even this was better

than being kept indoors in warm, ill-ventilated rooms the whole year. That it was a step in the right direction was shown by the growing tendency among phthisio-therapeutists to have their patients remain out of doors the entire twenty-four hours.

I have often had patients tell me, in explaining a rapid disappearance of medicine, "If a teaspoonful is good, a little more must be better, so I took two teaspoonfuls at a dose." But I think fresh air is the only remedy which would be efficacious in following such logical reasoning. The larger the dose, the better for the patients; but it is often difficult persuading them to take this view.

There are several plans by which the victim of tuberculosis may continuously breathe pure, fresh air by night as well as by day. Sleeping out in the open air is not harmful to a large majority of tuberculous people, and I have known surprising improvement in all the symptoms, as well as a remarkable increase in weight, to follow its adoption. I recall the case of a physician, who had consolidation of the right apex, with a tendency to hæmoptysis. Tubercle bacilli were present in the sputum. A residence of a few months at Liberty, New York, improved his condition slightly, and hæmoptysis was much less frequent, until without warning he had a chill and a hæmorrhage, followed by an afternoon temperature of 101 degrees to 102·5 degrees, which continued with morning remissions for a week. The physical signs during this period indicated an exacerbation of the tuberculous disease, which involved nearly the entire upper lobe. Microscopical examination at this date revealed a greater number of tubercle bacilli than before. At the end of ten days he was prevailed upon to sleep out of doors at night, as well as to remain out all day. It was in the fall, and the weather moderate when he began this practice, continuing it until

February, when he left Liberty, apparently cured. A year later when I examined this patient at my New York office, his condition was even better than when he left Liberty, and I informed him that he might live wherever he desired. He has lived and practised medicine in Virginia for nearly a year and a half.

Millet, of Brockton, Mass. (*Maryland Med. Jour.*, Feb., 1901), reports five cases, whom he recommended to sleep out of doors at night. They were socially of the poorer class, and could not incur the expense of a change of climate. They were allowed no roof over their heads, except in rainy weather. They wore soft felt hats and cotton night shirts, sleeping under ordinary bed clothes in beds arranged on the roofs of their houses. Remarkable results were observed. Improvement was noted in two weeks. Coughs disappeared, temperatures became normal, respirations were easier, and weight increased rapidly. No attention was paid to dampness and draughts, and heavy dews were regarded as inconvenient simply because of the necessity of drying the bed clothes. It may be contended that sleeping out of doors in the winter season is not practicable, and that a bedroom with an open window will answer the purpose as well. Experience has taught that such an argument will not stand if put to the test.

Sleeping in a small room with an open window does not appear to be nearly as beneficial to the patient as when the nights are passed on a verandah or in a tent, where there is a free circulation of air on all sides. The case of the physician before referred to is only one illustration of this fact. He at first occupied a small, steam-heated room with but one window, and it was never properly ventilated. Improvement in his case was not marked until after his acute exacerbation, when he began sleeping out of doors, as well as remaining out all day. If a patient is fortunate enough to have a large room

with a southern exposure, and containing one or two open fireplaces, in addition to large windows on three sides, which might be opened widely at night, he might derive approximately the benefit incident to tent life. But comparatively few people can command such a room, and it is the poor people and those in moderate circumstances, living in close, poorly ventilated rooms and apartments, who contribute most heavily to the tuberculous army that we aim to reach. These are the ones, too, who show so markedly the benefit by the great change to open air sleeping.

There have been reports from widely separated sections of the United States where tent life has been on trial, and the general trend of opinion is decidedly in favour of it. Thus, Stone (*Phil. Med. Jour.*, Oct. 18, 1902) believes it much better than living in a house in town. He advises using for one patient a tent large enough to accommodate four men. Craig (*Jour. A. M. A.*, Oct. 4, 1902), as well as Stone, dwells on the climatic conditions which exist in the region of Phœnix, Arizona—namely, a maximum amount of sunshine, a low degree of humidity, and an equable temperature—as most favourable to a continuous outdoor life.

In Pennsylvania, the Forestry Commission made experiments on a State reservation to determine the efficacy of the outdoor treatment, and have issued a circular letter in which it is stated that any reputable citizen of the State, who is seeking health, may establish himself on any of the State reservations, so long as he violates no law. The Henry Phipps Institute, which is to be erected near Philadelphia, is to be so constructed that every bed can be moved out on a balcony, and the patient kept in the open air day and night if necessary. In the State Institution for Consumptives at Rutland, Mass., the beds are arranged with an extension, so that the head of the patient may be projected at night. For this purpose,

a curtain is dropped from the lower sash of the window about the neck of the patient, ensuring warmth for the body, while with a cap on his head, the patient takes the "cure" during his sleep. In case of rain, he can raise the curtain and, without leaving it, roll the bed into the room or ward. This latter method does not seem to me a wise one. It is similar to an arrangement in vogue some time ago, whereby the patient was confined to his room, and directed to breathe the fresh air outdoors through a tube inserted in the window pane. This foolish plan was soon discarded. It hardly seems any more reasonable to confine the patient's body in one temperature, while his head is in another.

Guthrie Rankin, of London (*Brit. Med. Jour.*, January 18, 1902), suggests the possibilities of the open air treatment in large hospitals and advocates the establishment of open air wards in connection with them. He points out that the open air treatment has not only lowered the mortality, but has convinced him of its curative efficacy.

C. F. McGahan, of Aiken, South Carolina, suggests placing the patient's bed on a balcony or roof in town, while in the country an arbour or tent is most practicable. He prefers the circular to the Army tent, and thinks it better to place it on a platform two feet from the ground, and to do without carpets and draperies.

Tent life should be made as comfortable as possible. Draperies are not necessary, but rugs add greatly to the comfort and convenience of those in ill health, and their use can be made perfectly safe by exposing them to the sunlight for a few hours daily. Fortunately for the patients, the days of cold, cheerless rooms, without a suggestion of home, have passed. No longer is the already forlorn patient denied even the photographs of friends on the wall, nor is he obliged to dress balancing himself on one foot on a bedside rug about the size of a lady's handkerchief.

F. E. Waxham (*Jour. A.M.A.*, November 29, 1902) points out that tent life should be under medical supervision; that in addition to the air, the patient should have food, rest, and comfort, and that the strenuous life of a healthy camper should form no part of the invalid life. A. M. Holmes (*N. Y. Med. Jour.*, November 29, 1902) is convinced of the greater efficacy of continuous out of door life, and urges tent life the year round when the climate permits. C. L. Wheaton (*Indiana Med. Jour.*, December, 1902) also testifies to the usefulness of tent life. The majority of trials of tent life have been made in the southwest, where there is the maximum amount of sunshine with the lowest degree of humidity, and an equable climate conducive to continuous outdoor life. New Mexico, Arizona, and Colorado are most frequently spoken of in this connection. One writer prefers New Mexico and Arizona for the cold months, and the region about Denver for the summer season.

A tent sanatorium is soon to be established in Denver, Colorado, while at Liberty, New York, two tent colonies will be open during the summer months under the supervision of the writer and a local physician. One for the richer patients is located on the side of a mountain, which is the highest point between the Great Lakes and New York, and arranged in camps. These camps consist of a living tent that can be made any size desired, with as many subdivisions as may be necessary. In the larger room of the tent is located a large stone chimney with an open fireplace to be used in damp weather. One of the smaller compartments is used as a bath and toilet, the sanitary plumbing of which is made perfectly feasible by a main drainage pipe, into which all the waste pipes from the different camps lead, and which in turn empties into a meadow at the foot of the mountain. A shanty kitchen is also attached to each camp, and a telephone system connects

with the town of Liberty, some two miles distant. These camps are rented by their owner, completely furnished. Being protected on the north by dense forests and flooded by sunshine from the other points of the compass, makes the locality an ideal one for camp life. The patients derive all the benefits of a forest without the dampness and exclusion of sunshine.

The other camp is an extension of a boarding house, known as the Piney Woods Inn, the proprietor of which rents individual tents for sleeping and living purposes, while all the boarders eat in the common mess hall of the inn. These tents are intended for patients in moderate circumstances, who desire privacy, and yet cannot afford to pay more than ten dollars per week.

The selection of the style of tent to be used must be governed by the condition and circumstances of the patient. The ideal arrangement would be to have for the summer a wall tent, the sides of which could be elevated day and night, and lowered only to protect the occupant from a driving rain. This forms scarcely more than a sheltering roof, and is quite sufficient for the summer months. For the winter in a cold region, something more substantial is needed, and the conical tent of Gardiner, or the wall tent or tent house of Holmes, will answer. Both are constructed with the idea of obtaining the most perfect ventilation in all kinds of weather, it being possible, at the same time, to heat them to 60 degrees or 65 degrees when necessary. This method will ensure the maximum amount of outdoor life at all seasons of the year. Tent life in winter, with the temperature hovering about zero or lower, may seem an extremity; and it probably is for advanced or anæmic cases, although even these are made more comfortable, and their lives prolonged, by such treatment if with it they can have careful nursing and a warm room convenient

for toilet purposes. To my mind, lack of proper facilities for toilet and bathing purposes is the only drawback to this treatment for nearly all cases of pulmonary tuberculosis, no matter how far advanced the disease. But the point I wish to emphasise is this, the lives of many persons in the incipient or moderately advanced stages of the disease can be saved by a continuous open air life the year round. It is true, as has been stated, that such a life is more desirable in a climate like that of Arizona, New Mexico, Colorado, or Southern California but there are many who must remain at home—and perhaps even work—while receiving treatment. To those who still retain a fair degree of strength, good appetite and digestion, and are possessed of courage and a dauntless determination to get well, the winter tent life, or a necessary home modification of it to fit the purse, is not only possible, but desirable. How often do we see the pamphlets of summer hotels at the mountainous resorts frequented by consumptives, stating that those suffering from pulmonary tuberculosis will not be received. Nevertheless, it is not difficult to find them among the boarders. There is a feeling against the consumptive, and he is not considered a desirable guest. How much better then, for one to adopt the tent life and receive all of its benefits than to seek hotel hospitality under unfavourable conditions? The foremost of these conditions is the inability to secure a properly ventilated room with easily accessible porches or balconies, where one may remain throughout the day. The self consciousness of the patient forces him to neglect much of a prescribed treatment rather than attract attention to his condition. The changing, restless life of a hotel is apt to have a depressing effect upon the patient, who is compelled to forego for long periods the pleasure enjoyed by those in health about him. Then, too, certain sanitary precautions cannot be so well observed by the patient. I have patients located in

hotels and boarding houses, as well as isolated in cottages, and I must say that I much prefer those situated at the latter, where the prodominating influence of the physician is free from the disconcerting and even harmful suggestions and influences of acquaintances of a day or week. This may seem a small matter, but too frequently have I seen disastrous results follow such hotel life. We should therefore advocate the erection of tents in connection with hotels in health resorts. This would obviate the refusal to receive consumptive guests by the hotel authorities, and also render it possible for the families of patients to reside near them.

Now what can we do for the poor people of the cities, who cannot go to the country and hire tents, who can go to very little or no extra expense, and must continue working to maintain their families? For those without domestic responsibilities, who can give up work, there should be provision made by the city or State, and in connection with institutions for this purpose, open air wards or some modification by which the patient can obtain sleep out of doors at night, must not be forgotten. For the poor man whose family depends upon his meagre earnings, the lot is a hard one. There is sore need of charitable work among the tuberculars of this class. Even while they are often compelled to work under unfavourable conditions, much can be done for them. They can be instructed in hygienic matters: they can be taught the value of fresh air: the other members of the family can be better protected, and the earning capacity of the afflicted prolonged. No matter in what climate these sick poor people are found, they need fresh air, and if it cannot be obtained during the day, it should be obtained at night. It occurred to me, even as it did to Millet, that these patients should sleep outdoors at night. In the crowded tenement districts of New York City, the roofs of the buildings should

be utilised as far as possible. Tents or awnings could be erected, and the patients sleep out, not only during the hot summer nights, but far into the cold weather. It is often difficult to persuade the ignorant class that this is a proper proceeding. Indeed, I have sometimes heard professional men object to it : but once the habit is formed, and the patient made cognisant of its value by his rapid improvement, it would be easy enough for him to continue it indefinitely, and in very cold weather. Example exerts considerable influence among the ignorant classes, and when beneficial results are made apparent to them they are willing to make efforts that will benefit themselves. They may not be able to perceive the benefit of vaccination as a prophylactic of small-pox, but they cannot fail to observe that credit the desirability of the open air life when they have the example of a sick friend or relative made strong and capable of work by such a course of treatment.

Gentlemen, this is a subject worthy of the attention of our wealthy philanthropists, as well as the interests of the members of this Society, in bringing about a better condition of affairs. If the reporting of pulmonary tuberculosis were compulsory, and it were part of the duty of the sanitary inspectors to see that the sufferers observed certain sanitary measures and were provided with the necessary attention of a physician, who would push the open air treatment, I believe that it would go a long way toward stamping out the disease. It is a sorrowful fact that New York City to-day is without adequate facilities for the care of the tuberculous poor. Nor will the building of special hospitals for them be sufficient. Too frequently shall we find it necessary to carry our treatment right into their homes if we are to accomplish our aim.

Finally, a great value of open air treatment is its cheap-

ness, combined with its demonstrated efficacy. It can be arranged for all classes in nearly all climates with more or less comfort and enjoyment to the patient, according to his financial standing.

The most desirable site for a camp is not in a forest, but on the edge of woodlands, where one can have the full benefit of sunshine and free circulation of air, at the same time being within reach of shade on the hot days or protected from the winds that come with the colder weather. During the summer family relations and home life need not be interfered with in following the open air treatment: and not only will the patient be greatly benefited, but the entire family will thus be healthier and made less susceptible to the attacks of micro-organisms.

DISCUSSION.

Dr. Charles L. Minor (Asheville, N.C.): I scarcely deem it necessary before this body to advocate the utility of the open air treatment and out-door life in tuberculosis, but I regret very much to see the tendency in this country, if not abroad, lately, to suppose that the tent fulfils all the necessary conditions for that purpose. My experience teaches me that if we had as good a tent as Dr. Gardiner's it might be that a tent would give the proper cubic contents of air and the proper opportunity for change of that air, but I think that there is a tendency on the part of most of us to suppose that anything that is called a tent is satisfactory. My own experience has been that nine out of ten have a much less cubic contents of air than is proper; and that the patient really gets less change of air in such a tent in summer, and is less comfortable, than if he used a good portico, or in winter time, in a well-ventilated room with the windows open, and therefore does not do as well. I treated one case at home, in a tent, and found that the results were not good, and I accordingly moved him to a portico outside of the bedroom, and noticed a marked change for the better. I think the Germans have a much more correct idea when they advocate the "Barack" or cabins around the sanatoria, which are more easily ventilated, and have an ample window space and an ample cubic contents of air. It seems to me that the fresh air treatment may be pushed too far so as to terrify the general public

who are not educated up to the indications for fresh air in this disease. As far as the question of dressing in the cold is concerned, where the tent is supposed to offer advantages, I have found no difficulty—just shut the windows a sufficient length of time before rising and have the fire lighted. In conclusion I would state that while there is no doubt as to the need of plenty of fresh air and sunshine in the treatment of tuberculosis, I am convinced that these are better attained by either the "Barack" or cabins or the portico in summer, and the bedroom with open windows in winter time than by the use of tents.

Dr. Frederick I. Knight (Boston): I agree most emphatically with Dr. Minor in what he has just said with regard to the insufficient cubic capacity for air of tents in general. The economy of tents must be considered, which means that the air space and the facilities for its proper exchange will be limited, and I am therefore of the opinion that barracks or cabins, as suggested by Dr. Minor would serve the purpose much better. I am free to confess that the air in the few tents which I have been in seemed to me the worst possible for a consumptive to live in, and especially would this be true when artificial heating is necessary.

Dr. E. L. Trudeau (Saranac Lake, N.Y.) suggested that one of the main difficulties to overcome in the tent treatment is the providing of the maximum amount of sunlight.

Dr. Samuel A. Fisk (Denver, Col.): I wish to endorse strongly the position taken in this matter with regard to the great necessity for fresh air. I think that the other considerations are of minor importance. The main thing that we are striving for is to provide an ample amount of fresh air and sunlight, and the kind of tent to be used is another thing. Food is likewise of prime importance. I know from my own experience on the frontier that persons can live in tents in mid-winter, and I know from living in a tent myself that when one has become somewhat accustomed to tent life and has lived and slept in a tent he does not care to live in anything else. Another thing—there are thousands and tens of thousands of dark rooms in the city of New York, and that being the case it seems to me that it would be worth while for us to advocate food and fresh air as prime objects in the treatment of tuberculosis.

Dr. J. E. Stubbert (New York): I agree with Drs. Knight and Minor in the statement regarding the poor ventilation often found in tents, but in citing that fact we must not overlook the other side of the question, namely, that the ventilation of rooms in the majority of cases is much inferior to that found in the ordinary tent. Furthermore, a physician with a large country practice does not have the time or opportunity to investigate and see that the proper ventilation is provided for the rooms of his patients; his visits to such patients

are comparatively infrequent, his knowledge of ventilation is merely theoretical, and he cannot force his patients beyond a certain point. Personally, I think that a tent, when used, should be opened sufficiently to provide the proper ventilation, the sides being raised like wings during the day time and only lowered during cold and rainy weather. (Cites experience with reference to success attending fresh air treatment of tuberculosis as witnessed by him during the building of the Nicaraguan Canal.) I think the point made by Dr. Fisk, that a person who has once lived in a tent will live in nothing else, is true.

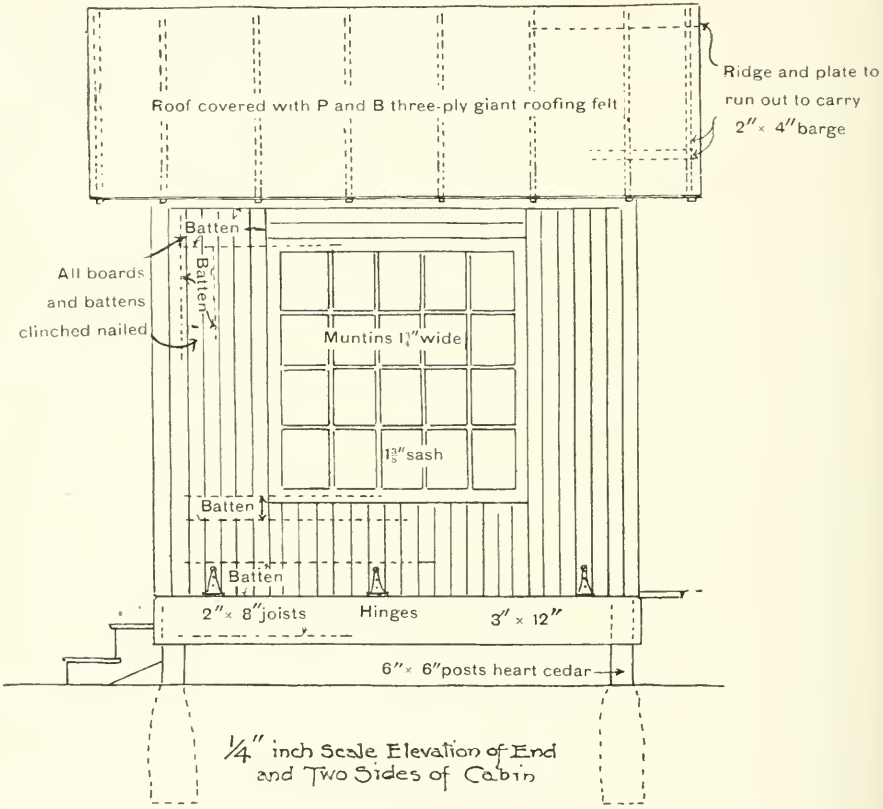
A CABIN FOR OPEN-AIR TREATMENT.

BY R. A. CLEEMANN, M.D.
PHILADELPHIA.

THE fact that tuberculosis flourishes among dwellers in houses, while many subjects of this fell disease recover living an outdoor life, has fixed attention upon the insufficient ventilation of our average houses, a defect which has long been recognised, but which up to this time has not been satisfactorily remedied.

In the hope of securing a larger supply of fresh air, it was natural that recourse should have been had to the use of tents, in the belief that enough air would pass through the canvas to keep the atmosphere within sufficiently pure and wholesome. This belief experience has shown to be questionable. I have known an ordinary large hospital tent occupied by sick—not wounded—men become foul to the nose in a few days when attention was not paid to the systematic raising of the walls and the openings of the end flaps. A familiar example of the comparative slowness with which gases penetrate a woven material is furnished by the well-known safety lamp of the miners. Though this lamp was invented by Davy in view of another principle—the cooling of the flame by the metal gauze which surrounds it—it would seem, unless the diffusion of the gases was greatly retarded by this barrier, the explosive compound would reach the naked flame too soon to give the expected security.

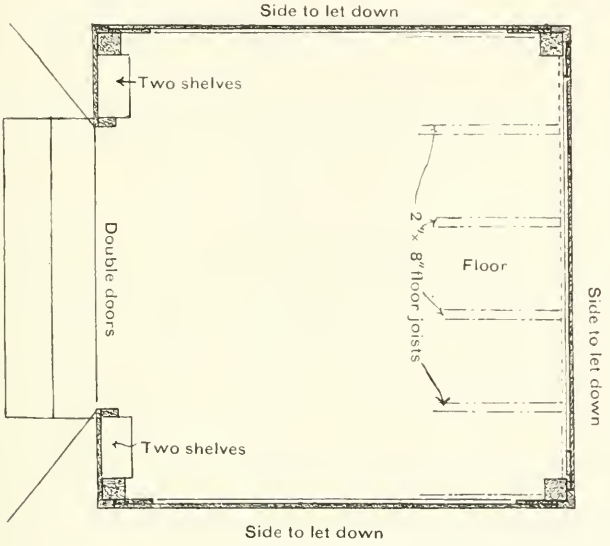
The shortcomings of the ordinary tent are further accentuated by the many devices which have been adopted to improve its ventilation; these, however, are as a rule the same which have proved unsuccessful in keeping tuberculosis



out of our houses. In most of them the ventilation is through an aperture which has been calculated to admit a certain amount of fresh air in a definite time, while an opening of corresponding size in another part of the structure discharges the foul air. The intention, of course, is that the fresh air will diffuse itself equably throughout the confined space,

and that the foul air will be proportionately driven out. It happens, however, that a current becomes established between the two apertures, so that the air passes almost directly through, leaving behind a considerable quantity of foul air.

I do not mean to imply that these ventilated tents are not a great improvement on the ordinary house; we have testi-



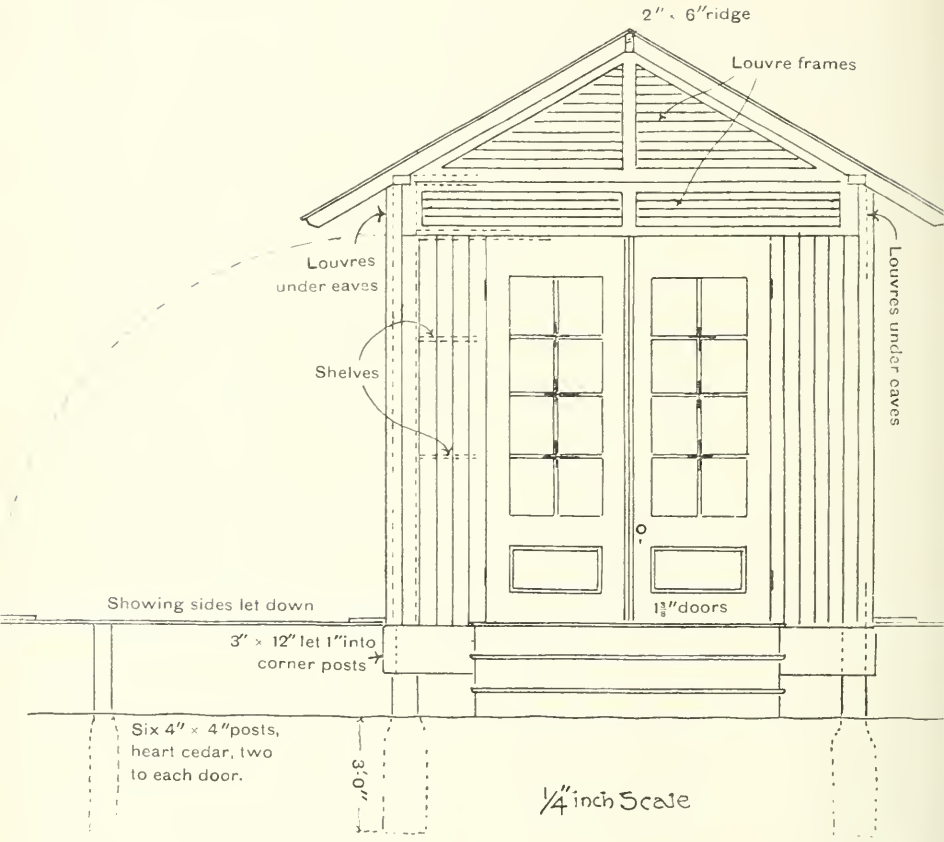
¼" Scale Plan.

mony from reliable authorities that they have proved very satisfactory in the care of tuberculous patients in their hands. At the same time, I think we can advance still further by supplementing this kind of ventilation by frequent and prolonged renewals of the air, *en masse*, if I may use such an expression.

I have endeavoured to accomplish this result in the design of a cabin, the plans of which are before you. In its construc-

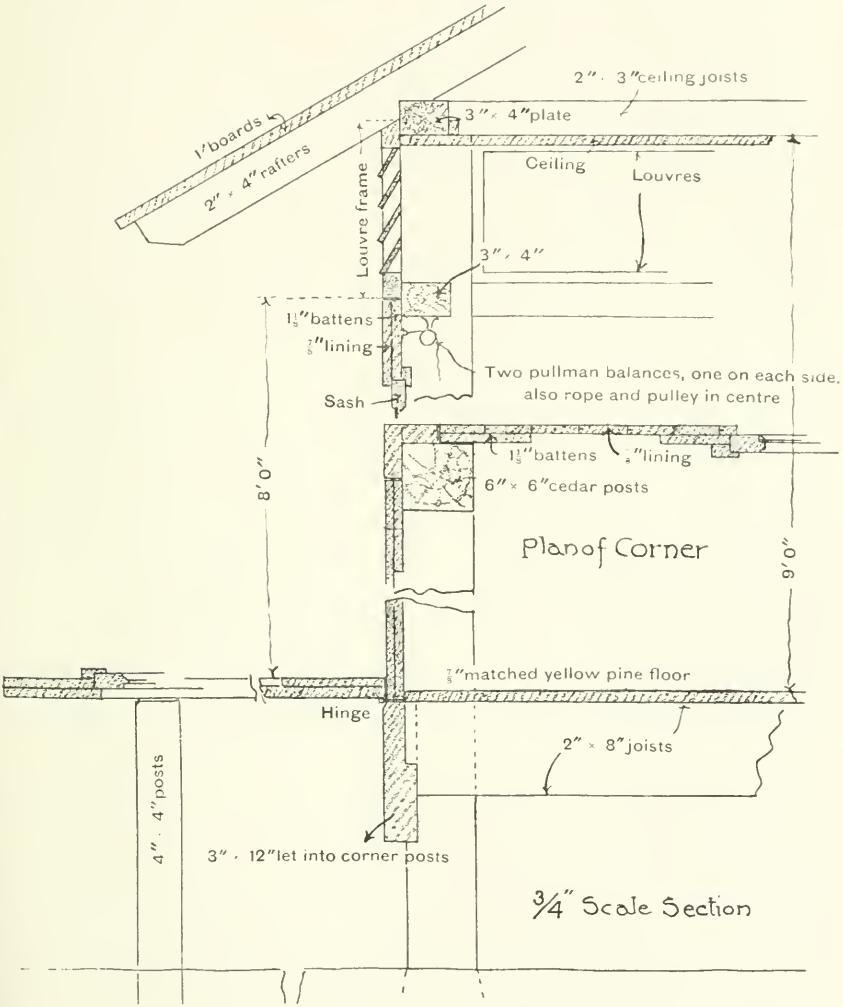
tion economy and simplicity of detail have been kept constantly in view.

Four cedar posts, six inches square, are placed at the four corners of an area ten feet square: the length of the



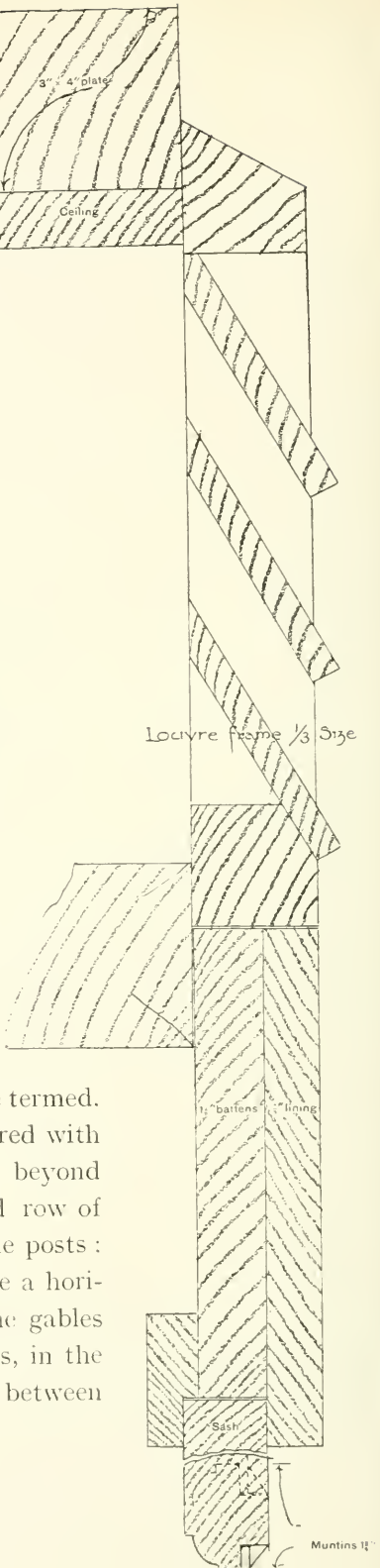
posts depends on the character of the soil, which determines the depth to which they must be sunk, but they must be eleven feet above the ground. Horizontal beams extend between these posts at a distance of two feet above the ground,

and on these the floor of the cabin is laid. The walls of the cabin, made of seven-eighths inch planking, are eight feet high. Three of the walls are hinged along their lower



edges, so that they may open outwardly and downward, posts being placed at a suitable distance outside the cabin to prevent their descent below the plane of the floor. When they

are closed they fit snugly into grooves, or rabbetting, as it is technically called, in the sides of the posts, and above into like grooves in a second row of horizontal beams eight feet above the floor. Each of these walls is provided with a fixed window, five feet square, composed of several panes. The walls are let down and raised by pulleys attached to the upper beams. The fourth wall is nearly entirely made up of two folding doors opening outwardly, each door having a window similar, though of course narrower, than those already described. On this side are the steps. The walls do not reach to the roof, for above them is a space a foot in height, partly closed by slats, or louvres, as they are termed. The roof, made of boards covered with felt, extends eighteen inches beyond the walls, and rests on a third row of beams placed at the top of the posts: it is peaked, and has at its base a horizontal false roof or ceiling. The gables are partly closed with louvres, in the same manner as the space between



the walls and roof. Other minor details are shown in the plans.

The chief feature of the cabin is the movable wall. When the three sides are lowered and the folding doors opened, the space before enclosed is at once flushed with fresh air and flooded with sunlight, while the walls themselves are placed in a position to receive on their interior face the exposure of the sun. This should always be their position in the hours of the day when the cabin may be unoccupied and it is not raining. When it is inhabited it is intended that two sides, except in the most inclement weather, should be always open, the closed sides, their windows admitting the sun and light, facing the direction of the wind. The folding doors permit the easy entrance and exit of the furniture. The other walls are made in one piece, and fitted closely into posts and beams, to avoid as much as possible any draught ; for the same reason the windows are permanently fixed. The space above the walls is for ventilation when these are all closed in the coldest weather, or during the violence of a rain storm. It is partly covered in by louvres to diminish draught and the entrance of rain, the latter being also guarded against by the overhang of the roof : but care has been taken to leave the spaces between the louvres large enough to admit the air easily. The false roof or ceiling is designed to make the cabin less hot in summer, and also serves the purpose of keeping out the rain, which might beat through the gables. The floor has been raised two feet above the ground in order that the passage of the air underneath may prevent dampness. It also avoids furnishing a refuge for vermin, large and small, which are apt to congregate under floors placed upon the ground.

The cabin is intended for a single person, but I think the provision for fresh air is ample to permit the accommodation of two. The cost of such a structure would depend, of course,

on the quality of the material put into it, and the distance of the spot where it was erected from depôts of lumber and the homes of mechanics: but Mr. Wilson Eyre, the architect, who has kindly had the plans prepared for me, has estimated the cost when these were at hand at about $200.

The most obvious objection to the use of this cabin in a northern climate is its coldness; but I believe this could be met by the use of a stove. The drawback to this mode of heating, that it overheats a small space, could be obviated by opening a wall in a direction contrary to the prevailing wind, dependence being placed on radiation rather than convection in the warming of the cabin.

The Commissioner of Forestry in Pennsylvania, Dr. J. T. Rothrock, has suggested that the reservation of forest-land in that State be thrown open to those seeking relief from tuberculosis. Perhaps the State authorities might be persuaded to put up some of these cabins free to those who wish to use them. In that case, the necessary thinning of the forest would furnish free at hand so much fuel that economy in this direction need not be considered.

DISCUSSION.

Dr. S. E. Solly (Colorado Springs) inquired as to whether the walls of the cottages proposed are hollow or solid, and was informed by Dr. Cleemann that they are solid.

Dr. Solly stated that he is very much more in favour of a hut with an air space in the walls than of a tent, as a more equable temperature may thus be maintained without adding much to the expense of building. He also suggested that it would be an advantage if the walls, instead of being allowed to fall down, were raised from below, thus giving more space and better protection during rainy weather, &c. Further, that it is very useful sometimes to have these huts constructed so as to revolve, thus permitting any portion of the hut to be turned to or from the weather. The advantage of a hut over a tent is that you can keep out the heat and the cold much better. The trouble with a tent is that, as has just been stated, it is apt to be too hot during

sunny weather and too cold in cold weather; and if you put a stove in the tent it is very hot near the stove, and one's face will be hot while one's back is cold. But when you cannot afford to have a sleeping porch to the hut, one like Dr. Cleeman's does very well, as it can be shut up and a stove lighted before dressing.

Dr. Charles Minor (Asheville) inquires whether the cottage described is at present made anywhere; if it can be purchased ready made, and if so, at about what price. States that one cannot get an ordinary carpenter to construct such a cottage properly and economically. Says that in Germany they are made in separate parts and shipped around the country, and desires to know if this is true of these cottages.

Dr. R. A. Cleemann: The reason the sides were not planned to be raised up was that in case they were so raised the sun would not have free entrance into the cabin, and also that the ventilation would be more or less interfered with thereby, as sometimes the movement of the air seems to be downward. With regard to what Dr. Minor has asked me, I would state that the price placed on such a cottage is only an estimate. I am sorry to say that it has not been tried yet. I would not have brought the plan before this Society had it not been for the kind encouragement of Dr. Curtin and Dr. Hinsdale. I intended to try it first. I think that an ordinary carpenter can make one for $150. The carpenter whom I consulted wanted $275 for the work and materials, but I believe that to be an excessive price.

SOME EXPERIMENTS IN THE TREATMENT OF PULMONARY AND LARYNGEAL TUBERCULOSIS WITH THE CONCENTRATED ELECTRIC ARC LIGHT.

BY WILLIAM CARR GLASGOW, M.D.
ST. LOUIS, MO.

In reading this paper before you to-day I am simply bringing to your notice a few experiments which I have been making with the concentrated electric arc light in cases of pulmonary and laryngeal tuberculosis. I shall try to show you the effect which exposure to the electric arc light produces on the pathologic processes, and the changes made in the physical signs. The interpretation of these changes can readily be made, and I believe I am warranted in saying that such radical, rapid change towards improvement has not hitherto been observed under other forms of treatment. The results obtained simulate those seen from prolonged residence in the West, and when we realise that these results have been obtained in a few months, whereas the results from climatic change require years in accomplishment, it certainly seems to prove that a powerful aid is given us for the prompt arrest of tubercular disease of the lungs. I first commenced these experiments through accident, without any confidence or enthusiasm, and it was only after repeated experiments that I thought I realised their value. That exposure to the concentrated light from the electric arc will kill bacteria has been demonstrated. Finsen, by such exposures, has killed various

kinds of bacteria in thin plate cultures in the course of a few seconds (Waldemar Bie). It is an important question, Can the chemical rays of an arc light penetrate through the body ? I think I have proved the affirmative of this question in showing the changes in the physical signs produced by such an exposure. The electrician who has had charge of this work for me also produced an effect on a photograph negative by passing the rays through the body with the negative placed on the back. This was accomplished with an instrument giving 30,000 candle power. The work of Finsen, of Copenhagen, in photo-therapy is well known, but he seems to have confined his experiments to superficial tubercular lesions. By this he has accomplished surprising results ; but I can find no reference to any work on deeper lesions. In a work appearing in the International Clinics, prepared at the request of Dr. Finsen by his laboratory assistant, Dr. Waldemar Bie, there is a full discussion of the use of light on superficial lesions, but there is no mention of its being used on lesions deeper seated. Without doubt others have given attention to photo-therapy, using the electric arc as a remedial agent, but in the hasty preparation of this article I have not been able to find any record of such work : hence I shall simply record my own experience with the light in its application to pulmonary disease. In a December (1902) number of the *New York Medical Record*, appears a communication from J. W. Kime, of Fort Dodge, Iowa, describing the use of concentrated sunlight after the manner used by Finsen. He reports favourable results. My own experiments were conducted under the most unfavourable conditions. The direct arc light used was one in use in one of the theatres ; it was operated by the electrician of the theatre. Hence there were many irregularities of sittings. The experiments were made in stormy winter weather, during the prevalence of an epidemic

of grippe, and the bad weather prevented regular attendance; and as all of the cases I report went through an attack of pulmonary grippe, with its abnormal physical signs, it was often a difficult matter to differentiate the physical signs of the grippe from those of the tuberculosis.

Cases.

Case 1.—Mrs. M., aged 25, was the first case on which the light was used. She came to me in July, 1902. She was in the third stage of subacute phthisis, greatly emaciated and weak, with daily fever and night sweats. Cough was very troublesome, with profuse expectoration, which on examination showed the tubercle bacillus. She had lost thirty pounds in weight during the previous six months. An examination showed a large cavity in the right apex partially filled with a liquid: gurgling, numerous, subcrepitant râles, and cracked-pot percussion sound were the physical signs. During the summer she continued to grow weaker and worse in every way. When I returned from my vacation in September I found her in such a weakened, emaciated condition that I declined to consider a climatic change which she urgently desired. I could not see any possibility of her living more than a few weeks. About this time her husband, who was an electrician in one of the theatres, came to me and asked to be permitted to give her the electric light treatment about which he had read some account in the daily press. I consented, not believing it could do her any harm, but with no hope of any improvement. At this time her condition was simply an aggravation of that found on the original examination. Ten days later I examined her again, and found a remarkable change in the pathological signs. The gurgling râles had lost the greater part of their fluidity, the fluid in the cavity being evidently greatly thickened; the subcrepitant râles had

largely disappeared, and there was a great diminution in the amount of sputum. She was feeling much stronger, and very hopeful. Her nutrition and her colour were improved. I now learned that she had been exposed to a concentrated arc light, with a current varying from 15 to 100 ampères, or from 12,000 to 50,000 candle power, daily in sittings varying from forty-five minutes to one hour. She complained of no inconvenience, and, as she expressed it, "it made her feel good." This was continued until the middle of October with steady improvement. At this time she reported that she had had a chill after each exposure to the light. This chill was a decided rigor, and continued for some hours, and was followed by fever. The light was now discontinued, and the rigors ceased. At this time an examination showed an absolutely dry cavity. No gurgling could be heard. There was pure amphoric breathing, with amphoric percussion sounds, and complete absence of bronchial râles. The sputum had almost entirely disappeared. She was exposed to the light for the last time on December 1. After this exposure she developed an acute laryngitis, from which she suffered so much difficulty in swallowing that she was able to take food only with the greatest difficulty, and at times only after the use of cocaine. This laryngitis continued for some three weeks and then disappeared. From this time she gradually grew weaker, and she died in the latter part of January. A few days before her death an examination of the lungs showed an absolutely dry cavity and an entire absence of all râles over the affected lung. The only râles to be heard were subcrepitant râles in the base of the other lung. The larynx was normal, except a thickening over the arytenoid prominences. There had been no expectoration in the latter days.

Case 2.—The seeming beneficial effect of the light on the

pathologic condition of the lung in the case of Mrs. M. decided me to try it again on another patient. J. C., aged 33, plumber ; November 16, 1902. Complained of a violent paroxysmal cough, with considerable expectoration, which showed the tubercle bacillus. He had afternoon fever, with night sweats. Pulse, 84. He was anæmic, pale, and weak, and very easily tired. His weight was 125 pounds; his normal weight was 135 pounds. He stated that he had lately returned from Cuba, where, according to his statement, he had a fever. An examination of the larynx showed considerable swelling of the arytenoid prominences, with diffuse, subacute, laryngeal catarrh. Examination of the lungs: Over the right infraclavicular region there was dulness on percussion ; on auscultation, subcrepitant râles, bronchophony, bronchial breathing ; over the left infraclavicular region, harsh breathing, with prolonged expiration, and bronchophony posteriorly. On December 4 the physical signs were unchanged under the usual constitutional supporting treatment with creosote, and such symptomatic treatment as he needed. The light was then for the first time applied. He was exposed ten times in sittings of about twenty minutes' duration, to a candle power beginning at 12,000 and gradually increasing up to 40,000. The first sitting produced dizziness, which lasted some fifteen minutes ; it was less after the second exposure, and did not occur again. Otherwise there was no inconvenience. *December* 20 : All râles have disappeared from the lung in front. The respiratory sounds are softer. Posteriorly a few subcrepitant râles can be heard under the scapula. The cavity is much improved, and expectoration largely diminished. No fever or night sweats. Feels much stronger and looks ruddy, having lost his anæmic look. He has been pursuing his duties as a master plumber, going out in all kinds of weather. Appetite good, and he is being fed to

the point of assimilation with eggs, milk, meat. Gained five pounds in weight. *January* 22, 1903: Caught cold. Had a small hæmorrhage, with pains in the limbs and a feeling of weakness. The subcrepitant râles have again appeared over the right apex. *February* 9: Has had no fever or sweats. Respiratory sounds normal, a few subcrepitant râles being heard on coughing. *February* 23: No râles heard in front. Posteriorly a few dry, gurgling sounds are heard under the scapula. His weight has increased nine pounds. Soon after this he had an attack of grippe, with an acute laryngitis and great increase in cough. There was swelling of the false cords, with superficial erosions. As a result of this attack he lost two pounds in weight. As the weather was very inclement the patient decided to go to Texas. He remained away until May 6. During this time, owing to bad weather, he caught a succession of colds; this, with the poor food, caused him to lose almost all the weight he had gained. He then went to Mexico, and began to improve again in the highlands near Monterey. When I saw him last (May 8) I found in the right apex, front and back, numerous subcrepitant râles, with increased voice sound. The condition of the larynx was greatly improved, the only abnormal change being a slight swelling of the arytenoid prominences. His cough was very slight, and there was no expectoration. He feels strong. Whether these râles are a return of the tubercular disease or simply a fresh bronchitis I am not certain, but their character seems to me to denote that they are tubercular.

Case 3.—J. M., November 20, 1902; aged 35, had active phthisis for two years. The disease had been in a stage of arrest for past year, and he has been pursuing his calling as a collector. An examination showed a large, firm-walled cavity in the upper part of the right lung; large mushy, gurgling sounds could be heard on auscultation. He

received eleven exposures, commencing with 12,000, during a sitting of ten minutes: this was gradually increased to 35,000, and the sitting to thirty minutes. Examination, December 28, showed a perfectly dry cavity; both physical and mental condition improved greatly. He received his last exposure to light on December 27. He continued to improve until the middle of February, when he contracted a cold, and he died from a profuse hæmorrhage.

Case 4.—November 18, 1902. W. G. Had lately returned from Texas, where he had been living during the past six months on a ranch with several consumptives. I was called to see him on account of a profuse hæmorrhage. After this had subsided an examination of the lungs showed infiltration of the right apex, increased voice sound, harsh breathing, prolonged expiration, and subcrepitant râles. Over the left apex, harsh inspiratory murmur. Had a slight cough with expectoration, which showed the tubercle bacilli. *December* 4, after five sittings, the respiratory murmur became soft, and all the râles disappeared except a few near the sternum. After the fifth exposure to light he developed a rise in temperature as high as 104°. This fever continued for five days, gradually growing less, until it disappeared. *December* 15: On examination no râles could be found over the lung; respiration soft and normal; feels strong and looks ruddy and well nourished. At this time he left for Texas, where it was quite cold, and he had a slight hæmorrhage. He is at the present time in Kansas, and, from reports, he is feeling entirely well.

Case 5.—F. M. D.; January 11, 1903; Age 38; normal weight, 142 pounds. Two years ago he had grippe with cough. Since then he had been losing flesh and growing weaker, which had been specially noticeable during the past two months. During the latter part of this period he

had a rise of temperature commencing at eleven o'clock and continuing until evening, and reaching at times 100°, 101°, and 102° F. There is an increased rapidity of the pulse. He has a cough occurring in paroxysms, with profuse expectoration, the cough paroxysms often ending in vomiting; voice hoarse, and speaking produces great fatigue. At the time of examination his weight was 114 pounds, a loss of twenty-eight pounds. A physical examination showed infiltration of the right upper third of the lung, dulness, a marked bronchophony, bronchial breathing, with numerous subcrepitant râles. Examination of the sputum showed the tubercle bacillus. On examining the larynx there was found an infiltration of the intra-arytenoid spaces, and a thickening with ulceration of the right vocal cord could be seen. The case was one in the second stage of phthisis, with tubercular infiltration of the larynx. He was exposed to the light first with a strength of 12,000 candle power for twenty minutes. This was gradually increased to 50,000. The first exposure produced dizziness, which lasted fifteen minutes, and his temperature rose to 104°. The second exposure also produced dizziness, and the temperature rose to 102°. After the third exposure there was no dizziness, but the temperature rose to 101°. *January* 17: He was feeling much stronger, his weight had increased four pounds, he was looking better, and the skin had lost its anæmic look and had become ruddy. His cough was greatly improved. Expectoration was greatly diminished. On auscultation there could be heard the physical signs of a cavity in the infiltrated area, a gurgling like that produced by a thick liquid. The percussion sound was amphoric. No subcrepitant râles could be heard. *February* 1: Has caught a cold, and shows the symptoms of grippe; has lost two pounds; no râles could be heard anteriorly, but posteriorly some subcrepitant râles,

more marked on coughing, are found. Temperature 100°; pulse 106. *February* 10: Cough has been greatly increased, with bloody expectoration. *February* 27: An examination of the larynx showed a disappearance of the ulceration and the infiltration, and swelling of both false cords had disappeared. *April* 5: Has gained eleven pounds; temperature 98·5°; pulse 88; signs of a dry cavity over apex; no râles; respiration soft, with amphoric timbre, and prolonged expiration over both apices. Feels well and strong, and has good appetite; has been doing his work steadily. *April* 8: Complains of sharp pains over left lung on breathing. Examination showed distinct friction sounds over the apex of the left lung. *May* 8: Respiratory sounds soft; amphoric breathing; respiratory sounds almost normal, with exception of soft amphoric breathing over dry cavity; no râles; larynx normal; his voice is clear and strong. He says he feels perfectly well, and has not lost a day from his work during the past month.

Case 6.—G. C.; March 11, 1903; Aged 24; normal weight, 155 pounds. Has just returned from Louisiana, where for six weeks he had what was called chills and fever. He was anæmic, weak, and somewhat emaciated, coughing a great deal, with muco-purulent expectoration, at times tinged with blood; sputum showed tubercle bacillus. Has had fever every afternoon, continuing into the night, with night sweats in the early morning. Normal weight is 155 pounds; now weighs 145 pounds. At the time of examination there was a normal temperature, with increased rapidity of pulse. Physical signs: Dulness in right apex anteriorly; subcrepitant râles; increased voice sound over dull area. *March* 18: Has had two exposures to light, each twenty minutes' sitting and 20,000 candle power. At the right apex signs of cavity with soft walls have appeared; a cracked-pot

sounds; gurgling râles with crackling sounds; posteriorly over the apex, subcrepitant râles. *March* 24: After exposure of fifteen minutes to light of 20,000 candle power he felt weak, and on returning home he had a profuse hæmorrhage. When I saw him bleeding had ceased, but the cavity showed numerous blood râles. There was no fever. At this time he had gained two and a half pounds in weight since March 11. *April* 10: Contracted a severe cold; cough returned, with afternoon fever, and sweats at night. *April* 27: Had gained nine pounds since March 11; looking ruddy and strong; voice sound was normal; respiratory sounds had changed, and the cavity sounds had entirely disappeared, as far as could be discovered by physical signs. In this case the first exposure to light produced a rise in temperature of 2°; later the exposures produced no change. *May* 4: Was exposed to light for twenty minutes with 25,000 candle power, a rigor following, and continuing for half an hour. This was followed by fever, with night sweats, and return of subcrepitant râles in the apex. *May* 22: Fever, night sweats, and cavity signs have entirely disappeared; no râles can be heard over the lung; inspiration slightly amphoric, with prolonged expiration; weight, 141 pounds. He is feeling well and strong.

A study of these cases will show a similar effect from the light. In all there is a diminution and disappearance of the mucous and gurgling râles in a comparatively short time; here is also a disappearance of expectoration. In all there is a great improvement in nutrition, with increased weight and stimulation of the circulation, shown through the improved condition of the skin. The time during which these cases have been under observation is too short to warrant any positive deductions as to the permanency of the result; and yet, when we consider that in the treatment of superficial

growths Finsen has given exposures varying from six to eighteen months, the change which has taken place in the short time is encouraging. Whether this improvement will continue under systematic light exposures is a question which cannot yet be answered. In Case 5 we see a steady improvement which has continued during the past five months. In Case 2 the disease seems to have again developed during an absence of three months in Texas, during which he received no light. In Case 6 the disease seems to be arrested in the lung. The effect of the light varies in different individuals. The exposure in some produces a rise in temperature, in others a fall, and in some it has produced an active fever, in others a chill, while in others there is no appreciable effect except the pleasant stimulation—these different effects being partly due to the temperament of the individual, the strength of the current, and length of the exposure. The question of dose, as it may be called—that is, the strength of the current and the time of exposure—has not yet been settled. I believe the proper strength will be that which penetrates through the body. Unless this is acomplished, we will fail to get results. In one of my cases a candle power of 12,000 removed the superficial râles, but the deeper râles remained until the candle power had been increased to 25,000. I am inclined to believe that a candle power of 20,000 is about the minimum. In regard to any possible danger from the light, I believe that it is harmless, except, possibly, in cavity cases. The systematic disturbance, probably due to the absorption of septic matter, is only temporary. In cavity cases, from my experience, I should be cautious. Whether the hæmorrhage which occurred in several cases was a sequence or a coincidence, a natural result of the original disease, is still to me an open question. I can readily see, however, how an artery can be opened, either by the destruction of tubercular tissue which

supports it, or when the artery wall has become infiltrated by tubercular degeneration. According to these experiments, then, it would seem that the result of light exposures would be, in tubercular cases a disappearance of the expectoration, drying up of the fluid in the cavities and in the bronchi, and a destruction of the area of tubercular degeneration. This is seen in Case 6. A cavity was rapidly formed in an area of tubercular infiltration. It also improves general nutrition, stimulates the circulation, and relieves pain in the chest. The instrument by which these results were obtained was a direct arc light, such as is used in the theatres, using 225 volts, and capable of giving approximately 40,000 candle power. The light was cooled by passing through distilled water, and concentrated by means of a rock crystal lens.

DISCUSSION.

Dr. Delancey Rochester (Buffalo) states that he has been much interested in the paper of Dr. Glasgow, as he himself has been experimenting for the last two years on the consumptives of the Erie County Hospital, using the actinic rays, and that he has obtained absolutely no beneficial results thereby; that the results were so completely negative that he could not persuade his colleagues to continue the experiments during their tenure each year. States that the treatment was tried on cases of varying severity, &c. Requests details as to the manner of application of the electric light, whether applied to the whole body or whether concentrated upon the chest alone. States that in his experiments the sittings were not nearly as long as those spoken of by Dr. Glasgow, and that the chest only was exposed to the rays. (The discussion terminated here on account of the hour for adjournment having arrived.)

THE SUSCEPTIBILITY OF THE NEGRO TO TUBERCULOSIS.

BY THOMAS D. COLEMAN, A.M., M.D.
AUGUSTA, GA.

That certain races furnish an inviting soil in which some diseases flourish is a matter of common observation. This peculiar condition of body is the result of heredity and environment, and is most aptly described by the word susceptibility. The study of the susceptibility of a people to a certain disease is an inviting and worthy work, and I have chosen to direct your attention in what follows to the susceptibility of the negro to tuberculosis; to fathom the causes, if possible, and to suggest such measures as may be within our reach to diminish it.

It has long been observed by physicians in the South, where perhaps 90 per cent. of the negro population resides, that tuberculosis is on the increase in that race. Before the war between the States, when the negro was a slave, tuberculosis was exceedingly rare, and some observers regarded him almost, if not quite, immune. In an article by Dr. James H. McIntosh, of Newberry, S.C., on "The Future of the Negro Race," one finds the following: "Phthisis was a disease unknown among the race prior to 1860. Among all those around me as I grew up I cannot recall a single case, and now, since 1865, in families where there had not been a case of phthisis to my knowledge for twenty odd years previous to that

time, parents and children have all yielded to the same fell disease, and entire families have disappeared. In one family of sixteen children, ten have died of scrofula and phthisis; mother and father still alive. Three months ago a negro man came to my office with three sons: one of thirteen years, barely able to be moved; one of seventeen years with cavity formed in lung: one of nineteen with marked incipient phthisis; left at home one son of fifteen too ill to be moved, and had buried the week before the eldest son, aged 23."

In a reprint of the Ohio State Board of Health, Dr. James Evans, of Florence, S.C., in an article on "Consumption amongst the Negroes," observes that the death-rate amongst the slaves on the rice plantations was very low from consumption, even though they were much exposed to the weather in winter, repairing dykes, cleaning out and digging ditches, &c., and notes that in Charleston, in the thirty-one years immediately following the war, there died from tuberculosis 1,525 white persons and 4,915 coloured. Dr. G. W. Hubbard, of Nashville, Tenn., in an article on "Consumption among the Coloured Population of the Southern States," points out that according to the United States census of 1890, the total percentage of deaths for the year ending May 3, 1890, was 11·1 among the whites and 15·4 among the coloured. For the same year the State of Alabama showed a death-rate of 8·1 among the whites and 12·7 among the coloured. "In Memphis, Tenn., the average for 1883-1886 was 129; from 1888-1890, 125; 1891-1895, 136."

Dr. E. H. Scholl, of Birmingham, Alabama, in the *Virginia Medical Monthly*, says: "From April, 1856, to April, 1862, when my army life began, a large portion of my work was among the slaves who were in that section of Alabama. They were well fed, well housed, and carefully nursed when sick, and I cannot recall in all my service in those six years

one solitary death from consumption among the slaves of my district." Dr. W. H. Geddings has also called attention to the increase in tuberculosis, especially among the washerwomen of Aiken, S.C. These observations could be multiplied, if it were desired, by many of the older practitioners of the South to-day.

Dr. M. L. Perry, in an article on "Some practical Problems in sociology shown by Study of the Southern Negro," says: "The records of the State Sanitarium of Georgia show for the year ending September 1, 1900, the death-rate, based upon the total number under treatment, was 5·8 per cent. in the white department, and 11·5 per cent. in the coloured department. From September 1, 1901, we find a death-rate among the whites of 6·7 per cent., while in the negro department it reaches 17·1 per cent." Dr. Perry adds that in the present year the ratio up to this time has been even greater, and this despite the fact that their treatment has been the same.

In further testimony of the fact, I have selected the towns of Charleston, S.C., Augusta and Atlanta, Ga., and New Orleans, La., as typical of the South, and give the mortuary tables for tuberculosis for whites and coloured during the years indicated in each table.

CHARLESTON, S.C.

Deaths from Tuberculosis.			Total Deaths.		Population.	
Year.	White.	Coloured.	White.	Coloured.	White.	Coloured
1898	47	221	491	1,258	28,870	36,295
1899	42	223	526	1,277	28,870	36,295
1900	40	194	484	1,242	24,285	31,522
1901	46	159	477	1,149	24,285	31,522
1902	36	181	461	1,154	24,285	31,522
Total	221	978	2,439	6,080	130,595	167,156

		White.	Coloured.
1898	Ratio of deaths from tuberculosis to total mortality	1—10·44 ...	1—5·69
1899	,, ,, ,, ,, ,,	1—12·61 ...	1—5·72
1900	,, ,, ,, ,, ,,	1—12·10 ...	1—6·40
1901	,, ,, ,, ,, ,,	1—10·37 ...	1—7·22
1902	,, ,, ,, ,, ,,	1—12·80 ...	1—6·37

Ratio of deaths from tuberculosis to total mortality for 5 years, White, 1—11·03
,, ,, ,, ,, ,, Col. 1— 6·21

AUGUSTA, GA.

Deaths from Tuberculosis.			Total Deaths.		Population.	
Year.	White.	Coloured.	White.	Coloured.	White.	Coloured.
1898	19	87	293	509	30,435	19,565
1899	31	94	366	530	30,435	19,565
1900	45	95	343	612	30,435	19,565
1901	28	112	317	600	22,876	16,565
1902	24	60	351	556	24,865	16,576
Total	147	448	1670	2807	139,046	91,836

		White.	Coloured.
1898	Ratio of deaths from tuberculosis to total mortality	1—15·27 ...	1—5·83
1899	,, ,, ,, ,, ,,	1—11·80 ...	1—5·82
1900	,, ,, ,, ,, ,,	1— 7·62 ...	1—6·44
1901	,, ,, ,, ,, ,,	1—11·32 ...	1—5·32
1902	,, ,, ,, ,, ,,	1—14·66 ...	1—9·26

Grand total for 5 years —
Ratio of deaths from tuberculosis to total mortality— White, 1—11·36
,, ,, ,, ,, Col. 1— 6·11

In other words, though the coloured population is 10 to 16 per cent. less than the white, in five years tuberculosis carried off 147 white persons and 448 coloured. In round numbers, allowing for the discrepancy in population, about twice as many coloured people die annually from tuberculosis as in the white race.

ATLANTA, GA.

Deaths from Tuberculosis.			Total Deaths.		Population.	
Year.	White.	Coloured.	White.	Coloured.	White.	Coloured.
1899	97	148	1,045	1.197	75,000	50,000
1900	80	134	916	1,014	79,000	52,000
1901	87	145	914	1,227	82,000	53,000
Total	264	427	2,875	3,438	236,000	155,000

1899 Ratio of deaths from tuberculosis to total mortality – White, 1—10·77
" " " " Col. 1— 8·08
Same ratio of whites would give death-rate 222.

1900 Ratio of deaths from tuberculosis to total mortality— White, 1—11·45
" " " " Col. 1— 7·56
Same ratio would give white mortality 203.

1901 Ratio of deaths from tuberculosis to total mortality— White, 1—10·50
" " " " Col. 1— 9·06
Same ratio would give white mortality 208.
Total ratio—Whites, 1—10·90; Coloured, 1—8·12.

NEW ORLEANS.

Deaths from Tuberculosis.			Total Deaths.		Population.	
Year.	White.	Coloured.	White.	Coloured.	White.	Coloured.
1897	405	454	4,268	4,462	195,000	80,000
1898	546	447	4,275	2.551	195,000	80,000
1899	544	490	4,913	2,980	210,000	90,000
1900	512	500	4,318	3,106	210,000	90,000
1901	483	452	4,037	2,441	210,000	90,000
Total	2,490	2,343	21,811	15,540	1,020,000	43,000

Cases hæmoptysis included. Pneumonic phthisis included.

	White.	Coloured.
1897 Ratio of deaths from tuberculosis to total mortality	1 – 10·53 ...	1 – 9·82
1898 " " " " "	1— 7·82 ...	1—5·70
1899 " " " " "	1— 9·03 ...	1—6·08
1900 " " " " "	1— 8·43 ...	1—6·21
1901 " " " " "	1— 8·35 ...	1—5·40
Total	1—8·95	1—6·64

With these facts at our disposal, let us attempt to explain the causes, and suggest such remedies as may be practicable.

It may be admitted at the outset that the negro has a peculiar susceptibility to tuberculosis that may, for the lack of a better explanation, be described as racial. That the disease made no serious inroads on the race in its savage state and in its condition of slavery is doubtless explained by the fact that it was not exposed to the factors that we now know promote the disease, and when so, their open-air, care-free existence tended to prevent its development. The same conditions are doubtless operating, though to a less extent, in the apparently more resistant white race. In his savage or uncivilised state, the negro lived a practically out-of-door life, such as we now know is best to throw off the disease after it has once developed. In his condition of slavery his life was bucolic in a large measure, and there was little of the crowding in cities that we now see. He was properly clothed, well fed, and snugly housed. His responsibilities were few, and when sick he was sure to be cared for by a competent physician. His transition from slavery to freedom was abrupt, but his blessings of freedom were not to come without their penalty. From a condition of absolute dependence he was made independent. His habits and mode of living underwent a radical change. From being cared for and directed, he had to care for himself and be the master of his own actions. In consequence, many flocked to the cities, and the withdrawal of restraint led to habits of dissipation and a disregard of the laws of health; and the prevalence of tuberculosis among them to-day is doubtless due more to their mode of life than to any racial peculiarity. It is conservative to say that most of them are ignorant of the fundamental laws of health; they are not neat in their persons or homes and they incline to live together in houses that are

often badly located and ill ventilated. They prefer to spend such money as they make on clothes or a melodeon than to the acquisition of a desirable habitation and the preparation of wholesome articles of diet.

I have often found a consumptive negro ill in a small house with one or perhaps two rooms, oftentimes with no window sash in the house, the solid window shutters being closed to keep out the air. In such quarters, with the patient expectorating over the bed clothing and floor, often a whole family exist. The bed clothing and personal apparel are innocent of the wash-tub, and individual cleanliness is accomplished through the medium of the family possession—a small tin basin. A towel serves the family in common; or any article of wearing apparel or bed clothing will suffice. The food is usually poorly cooked and lacks variety. Even in the houses of those in better circumstances these conditions exist in a less degree. In some there are evidences of neatness and thrift, and the household is regulated as it should be. It is not my purpose to decry or disparage the negro in what he has accomplished, for I think it has been much; but I am giving reasons which, in my opinion, account for the unusual mortality of the race from tuberculosis, and these, indeed, apply to other diseases as well.

Aside from his life in his house, the negro character at this time at least inclines to dissipation of various kinds; his morals are lax and his hours irregular, so that his constitution is depleted, and he is more apt to fall a victim to the disease. It was demonstrated by autopsies on all negro patients dying in the Georgia Asylum for the Insane in 1901, that over 50 per cent. showed evidences of tuberculosis.

Many of them are inadequately clothed, and even in those more well to do, the warmer underclothing is the last to be properly supplied, a more showy exterior being the desideratum.

Another element concerned in the spread of the disease among the race may be classed as occupational. Many of the women serve as washerwomen and domestics, and in washing the linen and cleaning up the rooms of tuberculous patients they are more exposed to the infection. The men are exposed to greater inclemencies of the weather, and often with insufficient clothing; and though free medical treatment and medicines are furnished them gratuitously by most cities, they are prone to neglect calling in medical aid until it is a necessity, so that the average case of tuberculosis appearing at the clinic or dispensary is usually far advanced in the disease.

Venereal disease depletes the race to a deplorable extent; and although I have heard it stated by some observers that syphilis protects the individual against tuberculosis, I can neither commend it as a prophylactic nor verify it as a fact. I have repeatedly seen the two diseases present in the same patient.

That the condition is as described cannot be contradicted by anyone who will take the trouble to study it. Is there any remedy? Yes, though it will take years of patient work and co-operation on the part of both races to compass it. The negro's moral education must go on through the labours of the better element of his own race and those of the whites who come in contact with him. He must be taught the havoc that dissipation plays with the body; that his home, to be healthy, must be properly located and neatly kept; that cleanliness prevents disease; that man, like other animals and most plants, requires fresh air and sunshine; that the crowding of too many individuals in a room is unwholesome; and that this disease at least is propagated by promiscuous spitting on floors and bed clothing. In addition to these, if the local Boards of Health will exercise their educational

influence, separating the diseased, and disinfecting every house in which a case of tuberculosis occurs, I believe the mortality from the disease can be wonderfully curtailed.

DISCUSSION.

Dr. Thomas Darlington (King's Bridge, New York City) stated that his experience bears out the facts presented in Dr. Coleman's paper; that he had 600 negroes under his care who had been brought to New York to carry on some construction work, and that they were very suspicious in regard to taking any medicine, one negro for whom he had prescribed quinine having taken the precaution to first try it on a dog, and after observing supposed ill effects decided that it would not be good for him to try himself. Stated that of the negroes under his care 100 per cent. had syphilis, and that many tuberculous patients were sent to Bellevue Hospital.

Dr. Thomas J. Mays (Philadelphia): I have been much interested in listening to Dr. Coleman's paper. About four or five years ago I undertook to investigate this relation between consumption and insanity in the negro. I communicated with eminent medical men in the South, and was informed that, for example, in the State of Georgia, there were before the Civil War, or before the emancipation of the negro, about forty insane negroes, and that pulmonary tuberculosis was practically unknown in that State. The same testimony came from North Carolina, and also from Mississippi and Virginia, namely, that tuberculosis was practically unknown in these States. Since the war they have erected two large hospitals devoted exclusively to the insane negro in North Carolina—I am not sure as to there being two, but am sure that there is one, at least—and I think one in Georgia and one in Virginia, and probably some others of the same kind in other States in the South. These negroes become insane, and after they have become insane they develop tuberculosis. The results of my investigation led me to believe that insanity comes first amongst the negroes, then probably syphilis, or possibly syphilis precedes insanity and then comes tuberculosis.

Dr. Charles L. Minor (Asheville): I desire to take issue with one point in Dr. Coleman's paper, namely, that of racial susceptibility on the part of the negro, which I do not believe exists. I think that the great prevalence of the disease in the coloured race is merely due to their surroundings, occupations, modes of life, &c., and that this is shown to be true by their very history before and after emancipation, as set forth by Dr. Coleman, who gives a beautiful example of the

things which produce an apparent susceptibility in the race—bad ventilation, fairly hard work during the day-time, excessive sexual indulgence beyond belief, and excessively late hours of retiring at night. No negro goes to bed before one, and thinks he is doing well if he gets there by three ; and he gets up at five or six, or possibly eight in the morning, and starts to work. These are all the necessary conditions, combined with bad food—the chief one—to produce an apparent inherent susceptibility. I do not believe therefore that a racial susceptibility to tuberculosis exists. Before the war they had an abundance of good food, their hours were regular, quarters carefully looked after. Now their quarters are abominable, their food is worse, and their hours are absolutely irregular.

Dr. Sanger Brown (Chicago) : Dr Coleman's admirable paper strikes the keynote in the etiology and treatment of pulmonary tuberculosis. It furnishes a conclusive demonstration that the cause of consumption is to be sought not in the bacilli but in general hygienic influences, and that of these pure air is certainly paramount. The attitude taken by our profession on this subject is anything but complimentary to our careful discernment and stability of judgment. However commendable it may be to encourage scientific research, no discovery, no matter how brilliant, ought to obscure the fact that consumption is at most only very feebly contagious—a conclusion that rests upon the common observation of centuries and is of such a nature that it cannot be gainsaid. Practically, thorough ventilation is the essential prophylactic measure in reference to phthisis, as was conclusively shown by surgeons of the British Army many years ago. Regiments were stationed in many different climates, and inasmuch as all the influences of a soldier's life in barracks may be so accurately estimated, the conditions were especially favourable for drawing definite conclusions. A very material decline in the prevalence of the disease promptly followed attention to ventilation of their quarters, all other conditions remaining unchanged. Without appearing to endorse promiscuous expectoration—for the abatement of a disgusting practice mitigates to some extent the self-reproach which our profession ought to feel for having promulgated a false faith—in the future let the bacillus be assigned its proper place, and let our practice and public utterances in reference to tuberculosis be guided by deliberation and common sense, by such valuable and incontestable data as Dr. Coleman has so tersely set forth.

Dr. Edward R. Baldwin (Saranac Lake, N.Y.) : I desire to take issue with Dr. Minor's statement about racial susceptibility as regards tuberculosis in the negro. I am convinced that such a racial weakness exists, and I think that this is amply illustrated by the susceptibility shown by various races toward certain of the infectious

diseases. Racial susceptibility is still a recognised factor, and I agree fully with Dr. Coleman in this particular.

Dr. E. O. Otis (Boston) inquired whether Dr. Coleman had collected any statistics with reference to the number of tuberculous whites in insane asylums as compared with similar hospitals for negroes.

Dr. Thomas D. Coleman, in reply, remarked: I am sorry to say that I cannot answer Dr. Otis's question with reference to the comparison between the white and coloured insane who are tuberculous. With reference to Dr. Darlington's statement regarding the reluctance of the negro when it comes to taking medicine, it may be that when the negro goes to New York he becomes afraid of medicine, but in the South one cannot please him more than by an abundance of medicine, and the worse the taste the more he thinks is being done for him. (Illustrates this by story.) If we gave the southern negro all the medicine he would take we would not have enough to go round. With reference to Dr. May's question about the percentage of mortality in the different diseases, which question is certainly a very interesting one, I am sorry that I cannot give him accurate figures, but I believe they run as follows: syphilis first—I think the percentage of inherited or acquired syphilis reaches nearly 75 per cent., though hardly 100 per cent., as suggested by Dr. Darlington; tuberculosis probably ranks second, and insanity perhaps third. However, in an exceedingly interesting article from Dr. Parry, he calls attention to the fact that there were something under 100 insane negroes in Georgia before the war, and that at this time the percentage has been increased to something like one insane negro for every 1,000 or 1,050 in that State. It has certainly, therefore, increased faster than any other disease we know of. We cannot measure syphilis at anything like this rate. I think that Dr. Minor's question about racial susceptibility has been answered by Dr. Baldwin. I think it is an undoubted fact that certain races seem to have a susceptibility for, and that they take the disease more readily than others. If it had not been answered, I think that in my own city it is answered by the statistics that I have given. In Augusta we have a large milling population, made up almost entirely of the "cracker" element (by cracker I mean a poor person, like the native poor people of the district); these people live very much under the same hygienic surroundings that the negroes do, and yet the percentage of tuberculosis is not nearly so high in them as it is in the negro race.

THE COMMUNITY AND TUBERCULOSIS.

BY BEVERLEY ROBINSON, M.D.
NEW YORK CITY.

THROUGHOUT the United States a fair appreciation is now awakened to our duties towards consumptives. This is shown by broad and enlightened work of Health Boards, by stimulating help from many physicians who have strongly urged their needs, and by contributions of money and effort by laymen and laywomen to build sanatoria.

The sanatoria are of two kinds essentially. First, those where the relatively well-to-do may secure the best care and treatment now recognised, for which, as a rule, a suitable pecuniary return is made. Second, those where the poor, homeless, houseless, friendless patient goes ulitmately to end his days with greater comfort to himself and with less risk to relatives, friends, and people generally. In the latter instance, and as much as may be, provision is also made to receive incipient and slightly advanced cases, which are the more acceptable ones, as they are by far the more curable. In the private sanatoria, provision is especially made for the latter sort of cases, and apparently for much the same reason. Within very restricted limits accommodation is also provided for the care of those who are absolutely poor. What has been done by us hitherto for the dwellers of our tenement houses is very little compared with what has been accomplished abroad—in Germany, France, England; and as nothing in

view of the great and urgent necessities of many thousands of diseased. Happily, some munificent donors have already arisen, and in the Phipps endowment notably we appreciate with gratitude the spirit and doing of generous and instructed private philanthropy. In appeals to State legislatures and municipalities by boards of health, by physicians, and by citizens for sanatoria to be put under judicious public control, and solely for the benefit of the very poor, we recognise the advent of a better era for very many tuberculous patients hitherto relatively neglected or ignored. Adequate provision, doubtless, will be made in the near future in the same or different institutions for the best care of such patients, according to the stage of the disease. To those who have a probability of cure under good ambient conditions all will be done to affect it. To those who at present, alas! are well nigh hopeless cases, their latter days will be measurably soothed and comforted.

To me the idea of sanatoria for the very poor brings joy and gladness, because I see in it prospect of cure for many, prospect of consolation for many more. To be sure, it will perhaps be a long while before we may legitimately hope, even with large and numerous public sanatoria buildings, to meet all requirements of the needy consumptives. But with their existence we shall have accomplished a great and noble though necessarily limited work, and we shall be able effectively to educate a large and increasing number of sufferers, so that when they return to their homes, stationary, improved, or cured, they will know better how to care for themselves, and how to protect others.

As to private sanatoria, especially for the favoured ones, and with one or two notable exceptions, I frankly confess I do not feel that the return of health and strength to relatively few patients justifies wholly the outlay of money,

labour, notoriety, in behalf of these institutions. I may be misinformed or in error: but in many ways I believe such patients, with their own physicians, and with large, sunny well-ventilated rooms, appropriate surroundings, good food, care and discipline, in a well-selected location in the country, would enjoy advantages not fairly counterbalanced by excessive *doing* and over *minute* regulations (often calculated to do more harm than good) of private sanatoria.

What shall I say for home treatment? To the vast number in our midst at present it is only the available treatment. Even if we could persuade very many among the poor to leave their homes and go elsewhere, there is no institution yet open to receive them. In the City of New York there is now accommodation approximately for 1,000 of her consumptive poor—there is requirement for 10,000 to 20,000 more! Fortunately the day of specifics is passing for all honest and intelligent practitioners. It is useless for enthusiastic or over-zealous men to laud and magnify (after very moderate or wholly insufficient experience and cases) this or that drug, this or that preparation, or means of cure. Hygiene in its broadest, best sense is, after all, our main reliance; and statistics based upon other means, no matter how favourably interpreted by their warm advocates, meet with little cordial response from those who have learned by long experience to become properly sceptical. Most of us now look forward to the bright day when, perhaps, a really efficacious anti-tuberculous serum shall be discovered—not a mere destroyer of bacteria; and perhaps with this destruction, great or irremedial injury to the blood, or other fluid of the economy: but rather to a serum which shall quickly neutralise or destroy those hitherto unknown toxins, of which the bacteria are but the formed and visible evidence of their presence and action. Better still, may we not even legitimately hope

that a serum will be discovered which shall produce, when inoculated, almost absolute immunity from the development of tuberculosis. Surely the admirable researches of Dr. E. L. Trudeau at his Saranac Sanatorium point in the not distant future, perhaps, to the practical realisation of this great hope for the race.*

What we want, what we insist upon for our poor, is better ventilation, more and better air, more sunlight, improved plumbing, greater cleanliness in their homes. To these essentials we add good food, properly prepared and served, a pure and plentiful supply of milk and water. Much of all this means, of necessity, therefore, improved tenement houses, and under no possible pretext to allow any unjust, iniquitous laws to be passed which would interfere with our ideals, or oblige us to take a step backward in our march of progress and greater civilisation. What shall we gain by following out such a plan? First of all, we shall secure a greater resistance on the part of a susceptible or already diseased individual to attack or further inroads of disease. And in this way we shall be doing much towards the ultimate inhibition of tuberculosis. Such an outline as that given above may be helped by judicious medical treatment, and this may be effected in the homes and in the dispensaries.

My statement has been proven already. I am glad to say (in a limited number of cases up to the present time), by Dr. John F. Russell, of New York City, at the Post-Graduate School and Hospital. Dr. Russell supports his patients by the administration of various fats in assimilable form; and by due attention to the condition of the *primæ viæ*, while they are submitted at the same time to frequently repeated feeding of appropriate kind. In this way he adds still

* See paper by Flexner in *Philadelphia Meaical Journal*, February 14, 1903.

further to the capital *of resistance in the individual patient*, which should be our primary object to develop, foster, and maintain. Many of Dr. Russell's patients have recovered; many more, as the years roll on, and the number of his patients increases, will recover. Dr. Russell's ideas doubtless, are based somewhat upon the facts fully made known to us twenty-five years ago by the late Professor Austin Flint, *i.e.*, that pulmonary tuberculosis was a self-limited disease (taking all cases), in the proportion of one to fifteen, and even in the midst of unsanitary surroundings, which up to the present time, unfortunately, are so usually the lot of the poor. It is only rational, therefore, to believe that, with improved surroundings, and better care and treatment, a far larger proportion would recover.

Let us bear in mind always that what is eminently true in our warfare against tuberculosis—so far, at least, as the condition of homes and food supply is concerned—is equally true as regards the bettering physically, and indeed morally, of all children and adults, who are obliged to live in relatively confined and close quarters. Hence, as we look forward and upward, whatever tends to prevent or cure the "great white plague" tends to the improvement and, so to speak, regeneration of the race; and the bulwark is thus strengthened and maintained upon which finally depends the continued greatness of the people of the United States.

In our efforts, however, to improve or abolish the nests of disease, we must never lose sight of the broadest humanity for the sufferer. Do not make him a social outcast! He is already sufficiently stricken. Do not add to his misery! Many patients who are unquestionably phthisical may still do light and healthful work, and continue to improve physically, and, indeed, ultimately recover. Is not this fact of immense importance? And not merely because it keeps

hope and courage alive, but also because, from a material and purely economic standpoint, it saves much money to the State, which otherwise is morally bound to be the caretaker and supporter of the doubly afflicted poor.

But it is often proclaimed that such people—the tuberculous—are a constant imminent danger to the others, to the well ones. This is not true if the patients affected with pulmonary tuberculosis be properly instructed and disciplined in their homes and places of employment. It cannot be too strongly insisted upon and too widely circulated, that tuberculosis *is not contagious* in the ordinary sense of this word, or contagious in the same way the eruptive fevers, for example, are contagious, through a third person, or through the air of the patient's room. One may be as safe in the room of a phthisical patient as anywhere else, provided, of course, every rational and important precaution and observance be upheld to prevent infection. The disease is infectious and communicable. *That* we know; but once more, this statement does not mean that it is *contagious*. To no one more than to Dr. H. M. Biggs, Health Officer of New York City, are we indebted for insistence on this fact of primary importance. Further, it is demonstrated and proven by the experience of well-managed consumptive hospitals and sanatoria.

"Moreover, without these precautions, but with otherwise good sanitary conditions, the danger is by no means as excessive as is commonly stated and supposed by the average layman, whose fears have been aroused. In Great Britain and in this country, so far as statistics are available, the mortality from tuberculosis had steadily diminished with the improvement of the standard of living and better sanitation, long before the general recognition of the germ and the present agitation for the special prophylaxis of the disease."*

* "The Consumptive's Crime." Editorial in *Journal of the American Medical Association*, November 15, 1902, p. 1259.

Viewed differently, what do we see? The crudest expressions of dire ignorance on the one hand, and extended inhumanity on the other. People who have a foolish, unreasonable dread, become immediately unreasoning, unkind, inhuman, un-Christian. In certain of our States and territories they have wished to enact laws to prevent consumptives from entering their borders. The National Government has even been requested to prevent consumptives from coming to the United States from foreign countries; and only so far back as 1901 the Treasury Department of the United States decided to classify pulmonary tuberculosis with dangerous contagious diseases, and to exclude all consumptive emigrants from entering the United States. Thanks to the intelligence, broad-mindedness, and, above all, the humanity of the medical profession, this order was strongly opposed. Thus far, unfortunately, their laudable efforts have remained without effect upon the powers that be.

On February 20, 1903, I received a letter from the Commissioner of United States Immigration Service that "the statute is enforced in accordance with the opinion" expressed by the Surgeon-General of the Marine Hospital Service, *i.e.*, that "tubercle of the lung is a dangerous contagious disease."

In the Adirondacks, where formerly consumptives encountered only affection, love, care, attention, sympathy, in many instances they are now almost outlawed at times from getting proper shelter and food, and simply because the "poor blind ones" imagine they will contract a terrible disease by reason of contact. This leads me to say, what I believe to be very important, that after all hygienic rules are obeyed and all precautionary rules laid down and insisted upon to protect the healthy, and also to prevent reinfection of the diseased, it is essential among the poor to provide proper disinfectants, spit cups, and paper napkins for sputa. In the outline of

home treatment in the new Phipps Institute this rule of action on the part of physicians or caretakers of the poor is duly and forcibly emphasised.

Finally, the broad statement still remains true, that without a susceptible soil no tuberculosis will develop in the vast majority of cases. Witness a little experience of my own. I served thirteen years in the outdoor department of the New York Hospital, where I had the class either of heart and lungs, or throat and nose. During that time I had three or more assistants at different times, and several students. I or my assistants passed at least two hours three times a week in the room where the patients were examined, treated, and prescribed for. In no instance that I recall was anyone amongst my assistants or students (of course, including myself) known to have contracted tuberculosis, and certainly in no instance was our attention directed to the room of the New York Hospital as being the source and origin of the disease.

So far as I know, at no time in the thirteen years referred to above was the room where I examined and worked over my cases ever thoroughly disinfected in accord with the notions that we now possess of the meaning of the term. Of course, patients coughed, expectorated, and frequently tuberculous sputa reached the floor, dried up, and were wafted freely later to the respiratory tract of us all.

On the other hand, with a susceptible soil the *development of the disease is very largely preventable*, always supposing that we insist upon the observance of rules, with this object in view, which we know and believe to be necessary. Shall we rid ourselves entirely of pulmonary phthisis? Perhaps not very soon, in view of all the numerous bad conditions of modern life, especially in our great centres of population and among the very poor, who are obliged to start in life being the

possessors of that hereditary susceptibility to disease which proceeds from one or more generations, probably of corroding care, unrelaxed labour, lack of proper lodgings, food, air, and sunlight. But with improvement, amelioration, a far better state of affairs is sure to come. It has already come—in small measure, it is true—thanks to noble, generous, sustained, self-sacrificing, almost constant effort on the part of physicians and laymen within and without our Boards of Health. The Utopian idea of complete banishment and destruction of tuberculosis from our midst may not come—indeed, it cannot come—in a day, or even in years; but eventually we hope, we trust, we do believe, it will be true, and our earnest, devout prayer shall be answered.

Suppose this to be an "*Ignis fatuus*," as some may call it, we may even then at least hope that "probably, in future years, tuberculosis may be a comparatively rare and negligible ailment; but if this is to be, it will be through rational and humane methods, and not reckless exaggeration and stimulation of insane public fears, with their natural result of brutal inhumanity to the unfortunate."*

To show to what lengths this inhumane spirit, even in our profession, may go, I have only to cite the writer of an article lately published in one of the leading New York medical weeklies,† who appears to charge many consumptives "with a deliberate criminal tendency to spread their disorder."‡

To show the other side of the picture, and the one we would dwell upon, believe, and know to be true, I will cite from an article in the current issue of *Charities* (February, 1903): "There is at present," the article states, "no other disease

* *Journal of the American Medical Association*, November 15, 1902, p. 1259.

† *New York Medical Journal*, February 8, 1902, p. 238.

‡ *Journal of the American Medical Association, loc. cit.*

which is receiving so much attention at the hands of social and philanthropic workers. One reason may be that its cause is so well defined, and the methods whereby its spread can be prevented are so simple, that they may be easily grasped by the public. There is reason to believe that within a comparatively short time the United States will have as complete an organisation for the prevention of tuberculosis as any to be found in Europe."

To my mind, tent life is the perfect life for consumptives or those threatened with the dread disease, for in this way, and in this way alone, may they keep their lungs filled all the time with the best air possible, and by adoption of this method of treatment, we have a guarantee of cure in certain cases, where it appears to be almost essential, if this most desired result is to be attained. For this reason I believe, independently of the questions of less expense and larger numbers provided for, the New York Board of Health has wisely determined to adopt the method of tent treatment of the consumptive poor, in the incipient or primary stage of disease, whose cases it may be able later properly to care for.

No doubt, also, the amount of exercise, judiciously proportioned in individual cases, which to many a camp life almost necessitates, is additionally a reason why tent life is an ideal life for these sufferers. Keeping the tent "ship-shape," or keeping the camp cleanly, orderly, attractive, is surely useful and beneficial work for them. Their minds are agreeably occupied, and their bodies freshened and strengthened in performing the tasks, with this object in view, duly assigned to them.

Except in the febrile exacerbations of the disease, or in cases of extreme weakness, there are few instances in which tuberculous patients will not obtain distinct advantages from this mode of life over any other, provided, of course,

the tent or camp life is followed in a desirable locality and with ambient surroundings in every way hygienic.

Latterly, Dr. A. Mansfield Holmes* called particular "attention to the essentials of an ideal tent cottage, and gave rules for governing tent life." . . . . "A model of the tent cottage adopted by the Rocky Mountain Industrial Sanatorium was exhibited" by him before the Mississippi Valley Medical Association, "showing improved methods of construction and ventilation."

DISCUSSION.

Dr. Frederick I. Knight (Boston): While sanatorium physicians are perhaps the proper ones, with their statistics, to defend the sanatorium treatment, there is no doubt but that tuberculous patients may recover under all conditions, whether treated or not treated; many of them have recovered in my practice under the most disadvantageous circumstances, with no proper hygiene or care of any kind. Of course those cases are comparatively few. Others have recovered under old-fashioned treatment, but I do not hesitate to say that far more, very many more, have recovered under the proper modern treatment, which we call sanatorium treatment. It is not necessary for a person to be in a public institution, but it is very important for him to be away from home, if possible, particularly if he lives in a rigorous climate. He can be away from home, for instance, in a private house at Asheville or at Saranac Lake, and be treated practically on the sanatorium plan; but he must be away from home, and I have always advised a patient, even if living in a good climate, to go out of his own home if he wished to be treated to the best possible advantage. That is very much more true though in the case of a rigorous climate. It is impossible in New England to make a patient live on the piazza, to live out of doors all day long as they do in the Adirondacks, for instance. He will do it there because everybody else does it. But it is different in New England; it necessitates his being alone all day long, and he would not do it; he runs in to the furnace or stove, or whatever it may be, because the rest of his family is there. So I say that the home treatment cannot be carried out so satisfactorily in a cold climate. Now in regard to

* *New York Medical Journal*, February 21, 1903, p. 346.

tents. I never saw a tent that was comfortable in summer; it is too hot with the heat of the sun, and in the winter the air must be foul. I do not see how we can heat and ventilate a tent in cold weather so that the patient has pure air.

Dr. E. O. Otis (Boston): Dr. Robinson seems to disparage, I might say, the private sanatorium for paying patients. There are two points, I think, that it is well to bear in mind in this connection with regard to private sanatoria. Dr. Knight has just referred to one; that is, the control of the patient. You may have a patient who could command any amount of money who lives in the country, who can turn his whole house into a special sanatorium, and still you may not be able to maintain absolute control of that patient, which is one of the most important points in the sanatorium treatment. I had an experience of that sort this very last year: the patient was wealthy, the house was in the country, it was on a hill, had verandahs on all sides, and every condition so far as material resources were concerned for good treatment; but the husband of the lady declared that she could never be properly controlled, and consequently she was sent to a paying sanatorium, where she is recovering. The second point I desire to make is this: the educative influences of the sanatorium treatment. In Massachusetts we are experiencing the great value of the teachings of the cured patients, the graduates of Rutland, upon the community. Is it not as important that these paying patients should give us that influence upon the class of people with which they are brought in contact? It seems to me this is a very valuable and important matter to be kept in mind. One thing further. Dr. Robinson has referred to the cruel and inhumane treatment accorded in many cases by the unreasoning fear of others in regard to this disease. I think that the profession itself is largely to blame for this. I do not know of any other one thing that has done more perhaps to create that undue fear than the signs which we put up in all of our street cars, and at our stations and many other places, against spitting. That is all right, and I believe in it, but it seems to me at least inconsistent to have a large sign with regard to spitting on our street cars, and not to pay any attention to the matter of pure air and ventilation. As a rule the ventilation in our street cars in the winter season is simply atrocious; and should we not now turn our attention to this crying evil as one of the direct means of preventing tuberculosis, having abated the spitting nuisance?

Dr. S. E. Solly (Colorado Springs, Colo.): I fully agree with what Dr. Knight has said about sending consumptives away from home. Old Horace wrote that those who travelled across the sea changed the sky but not their spirit; but in the case of invalid travellers at least, this is not true. I am sure that when a man is stricken by

a chronic disease a change is valuable, even if it is only a few miles distant. Not only from a climatic standpoint, but because of getting into new surroundings his interest is aroused, and with the elimination of the monotony of an invalid's life at home, comes a change of spirit and a renewed impulse to fight for health. With reference to the proposal to build a tent city for the poor in the outskirts of New York, while residence in it will be much better for them than in their unsanitary crowded homes, and far better than keeping them circulating around the general hospitals, yet it would be still better to put them in wooden huts. These huts should consist of a single room, with a porch on the south side, on which the patient can sleep and sit, while the room, with a small stove in it, would give them a warm place to wash and dress in and afford shelter from storms or heat. These, if built in rows facing south, can be constructed for about $150 a piece, while a properly constructed tent will cost as much as $100, and cost more for repairs. The chief objections to a tent are that changes of temperature readily penetrate its walls; on the other hand, the wall of a hut can be made with an air space, which will largely protect the inmate from feeling such variations. During the winter a tent is generally too cold at night in severe weather. Strange as it may be, yet it is true that a person feels the cold much less when sleeping on an open porch than in a tent or room. During cold stormy days, when the patient is confined to his tent and has to have a lighted stove, he bakes on one side and freezes on the other, his toilette is made with difficulty and distress, while bathing is apt to be postponed. In summer the early morning light, as well as the heat and the flies, are often very trying. While there are well ventilated tents, yet they are more often close and stuffy. In a sanatorium the example of the other patients following the rules of health is an incentive to right living, whereas in the home the invalid experiences the impulse to follow the life of the other members of the family, and feels lonely and deserted if forced to do otherwise. The objection is often made by invalids to entering a sanatorium that the society of sick persons depresses them, but if they are finally induced to go to a well conducted sanatorium, this prejudice quickly vanishes and it is supplanted by a spirit of hopeful cheerfulness.

Dr. DELANCEY ROCHESTER (Buffalo): That these cases should be sent away from home for treatment is no doubt true; but, unfortunately, the vast majority of the cases that come under our observation are among the poor, and it is absolutely impossible for them to go away, and then we have to treat them at home, and here comes in very well the suggestions that Dr. Robinson has made in his paper. Dr. Knight says that the rigorous climate makes it impossible for outdoor treatment in many places. This is true only to a limited

extent, I think. In Buffalo we have a very bad climate for cases of tuberculosis, high and severe winds, especially during the winter. Moreover, we have less sunshine there around the lower lake region than in almost any other part of the United States, and still I have had patients, who, when I explained to them the very great importance of living out of doors, have followed instructions, lived out of doors, slept on verandahs, and have improved, and some of them recovered. Unfortunately, however, the vast majority of those who live at home have not the verandah to sleep on, or any other suitable place, not even a roof to go up on to sleep ; they have to sleep in their houses, and now you are confronted with a proposition different from those that have been exploited. Now these are the practical facts. People who live in tenements cannot be treated in this way. What are we going to do now ? This is the time, I think, to compel them to go to the proper place of treatment, the sanatorium. I think this is an important part of the treatment of these cases. They cannot get well at home in dark rooms, and where many of the rooms open on wells, and some sleeping rooms having no windows in them at all. I know of a family at home, five in the family, and they lived in two small rooms ; the father had tuberculosis. I succeeded in getting him to go to the Erie Co. Hospital, and he improved very much during the winter, and in the spring he went home, where he lived in his dark rooms without sunshine and without air to amount to anything, and could not be persuaded to go out of doors very much in the spring on account of the bad weather and particularly high winds. His tuberculosis increased, and three of his children developed tuberculous glands in their necks within four months. Now there is a condition that is very difficult to meet unless we have the power to compel cases to stay in sanatoria until it is safe for them to return home.

Dr. Thomas Darlington (King's Bridge, N.Y. City) : The physician in handling these cases has four duties, namely, his duty to the family of the patient, the patient himself, and the community and neighbourhood to which he considers removing this patient. In regard to this matter of removing patients, and of keeping them in tenement houses, take it in the city like New York, for instance, which has a large cosmopolitan population and where a great many people (30,000) live in lodging houses, and where 25 per cent. of these go to bed every night with their boots on ; and we talk about ventilating these rooms, especially in a winter like last winter with no coal. It is an absolute impossiblity to get fresh air into the tenement houses in New York. It is like trying to control the vice of New York City ; you cannot do it. The only way to do with the vast majority of these tenement house people is to remove them from the city ; and how

is that going to be done? You cannot educate them up to it. I have tried in one hospital for years to educate these people up to spitting in cups. They only do it so long as they are watched, but when left alone they expectorate on the floor. The majority of the people who have tuberculosis in a city like New York are uneducated, and unwilling to do anything to comply with the laws of the city; and I do not think, notwithstanding the ground that Dr. Robinson takes regarding the contagiousness of tuberculosis, that anyone at this date would be willing to say that it is not important to look after the sputa of these patients, and I think that it is a good thing that we have signs up in our cars, even though it frightens the people. Now, we have a difficult time in New York; just as soon as we want to remove the patients from the city, the Legislature passed a law that no consumptives should go to any part of the States without the consent of the Board of Supervisors of that county. And they talk about erecting a colony of tents in New York for these cases. There is no room in the city, and they cannot get out of it. This is for the poor people. Of course it is all very well for those that we wish to send to health resorts. I believe in sending most of our patients away to such places as Colorado; get them where they can have fresh air, &c., and no doubt they will get well. But what are we going to do with the rest of the people? Are we to leave them in their dark rooms with their families, possibly a large family which the mother supports by washing, &c.? These are the vast majority of the cases. It will not do to simply agree for tenement house reform, and especially to talk about fresh air, when we have the rapid transit with its cars vastly overcrowded every night and morning, and when we must breathe bad air. It would be all very safe, provided we could carry out the things which the doctor speaks of; but I feel that that is an absolute impossibility. And as for the question as to where we shall remove these patients, we also owe a duty to the community to which we take them. I have had a little experience with that recently with some people who wished to remove up in my neighbourhood, and bring up about forty consumptives—a place for the dying, they said. They could not take them out of the city, and they wanted to get them out of the tenement houses, and so they brought them up to our neighbourhood, where there were a great many people who now complain because the value of their property has decreased fully one-half. So the question arises, have we any right to injure the well and healthy in this way? This is another consideration.

Dr. Carroll E. Edson (Denver): It seems to me that in the present condition of public fear and professional enthusiasm in regard to the contagiousness of tuberculosis, with all our bacteriological

study, &c., we have taken the view that the tubercle bacillus is about the same size as a boa constrictor. The sputa are the only sources of danger from tuberculous patients. As Dr Darlington says, the majority of this class of people in the cities do not want to be clean. Tenement house reform puts in enamelled bath-tubs in tenement houses. The same way with the hygienic methods. We build our sanatoria with rounded corners, and the people get the idea that unless they can have these elaborate methods, these marble wall sanatoria, under their control that they cannot do anything with the problem. We have got to come down to the practical. They cannot comprehend our knowledge ; we only scare them, and cause them to overlook the simple methods of treatment, which are productive of the most good. If we cannot be hygienic, let us be as hygienic as we can.

Dr. R. C. Newton (Montclair, N.J.): All this reminds me of the cattle inspector who visits the dairy, and finding tuberculous cattle, orders them to be killed, and then goes away. The man that owns the cattle then buys others to replace them, but buys inferior cattle. The next year the inspector orders more of the dairyman's cattle to be killed and goes away, and the dairyman buys more cows of a still lower grade ; and so on, the local conditions and the state of the herd getting worse all the time. No proper effort is made to correct the unhygienic surroundings, which are probably the true source of the infection. In the same way, it is of very little use to pick out, here and there, a very good tenement house man, who wants to be healthy, and take him off somewhere ; nor in occasionally putting in the "marble bath-tub." By redeeming a small percentage of those that are already consumptive, one does some good ; but we are attacking the problem at the wrong end. It is not chimerical nor absurd to insist upon better hygienic conditions in tenement houses, and to teach the poor and the rich how to live so that they may be able to resist the infection of tuberculosis. That infection is practically universal ; and the fact that the majority of us escape it makes it entirely reasonable to suppose that many thousands more would escape it, if we could improve conditions of living that every one knows are inexcusably and even criminally bad.

Dr. Richard A. Cleemann (Philadelphia): It seems to me that the problem of taking care of the tuberculous poor and the difficulties in the way are much exaggerated. They are not as numerous as they seem to be. Of the 2,500 in Philadelphia to-day, 500 are able to take care of themselves, thus leaving but 2,000 to be taken care of by the city ; this is not a great problem. It seems to me that if the proper spirit is developed the solution of this question is simple, namely, to get these people out of their homes and under the care of some institution controlled by the State. A million dollars

a year is very little for a community to expend, which spends thirteen or fourteen millions annually, and I think that this sum would be sufficient ; and I trust that this will eventually be the outcome of the problem, that the cities will reserve in their neighbourhood a lot of ground that is not covered with houses, especially in the city of New York. There is Staten Island, any large tract of ground there would do, on which we could put not a tent city, but a barrack city ; and there are other places in the neighbourhood of New York which would do for the purpose.

Dr. R. G. Curtin (Philadelphia, Pa.) : I have for a long time been considering the attitude of the profession and the public on the contagiousness of tuberculosis, and last spring I read a paper on the subject, and made a number of statements which may not be inappropriate now. In the first place, is tuberculosis as contagious as a great many physicians appear to make it ? I do not think so. I know of one man with an ulcerated condition in his lungs, who for six years was constantly in a ward of from twenty-eight to thirty-four consumptives, and yet that man in all that time had not a single tubercle bacillus in his sputum, although it was examined hundreds of times, and after his death the tissues failed to show anything like tubercle bacilli in them. This man lived in this atmosphere for six years with apparently a very good soil in which to plant the bacilli, and still they were not planted thereon. There is another point which I wish to call to the attention of the profession here : that the majority of the doctors who belong to this Association who have been affected with tuberculosis have gotten well while they were attending just such cases, generally, of course, with a change of climate. But those of us who live in a tuberculous climate and large cities, it seems to me, would have no excuse for living if it is so awfully contagious. At the present time, especially in the large cities, the consumptive is so much avoided that really life is made miserable for him. You go into the private family, and he is relegated to the third storey back room, and the family kept away from him. Some time ago in a street car in Philadelphia a man got on the car, he had a hollow, racking cough, and was very pallid, &c., and several ladies who were riding on the same car got off and waited on the corner for the next car. They were afraid to ride with this man ; and the fact is, that I believe that at the present time cases of tuberculosis are more studiously avoided than lepers.

Dr. Charles L. Minor (Asheville) : What has just been said about the fright so prevalent concerning tuberculosis is very true, and I think that the trouble is largely due to the medical profession. We unquestionably are the ones who are to blame for the present attitude of the general public. We have educated them foolishly,

have been bad teachers, and now it lies with us to educate them in the right way. An intelligent doctor can educate his patients if they have confidence in him, and can show them the nonsense of this unreasoning fright regarding the contagiousness of this disease, and I think that this is one of our chief duties. We must keep them aware of the fact that it is transmissible, but assure them that it is nonsense to live in constant dread of its contagiousness.

Dr. Thomas W. Harvey (Orange, N.J.): A word as to the good influence of ventilation. While my home is one of the old health resorts of the East, it has also had for many years a large population of hat-makers, and twenty years ago these hats were made in small shops, poorly ventilated, and with all the worst conditions possible, dampness and lack of fresh air; the men that worked in them were very generally given to drink, and tuberculosis was prevalent. The hatters died of two diseases—chronic mercurial poisoning, called "hatters' shake," and tuberculosis. During the past twenty years the small shops have disappeared, ventilating processes have been introduced, so that the dust is removed, and to-day it is a rare thing to see chronic mercurial poisoning, and tuberculousis—although these people are living very much as they did before in the way of drinking—is no more common than it is among other classes of workers. I cannot give you the figures, but for a number of years I have watched them carefully in the death returns from my county, and the diminution is something very noticeable indeed.

Dr. R. H. Babcock (Chicago): As I understand the gist of Dr. Robinson's paper, it is, in reality, an argument against the establishment of sanatoria for the treatment of the consumptive poor of our great cities. I should like to point to the attitude of the Germans in this respect. What is being accomplished in Germany is the greatest possible argument in favour of the establishment of sanatoria for the consumptive poor. There is, of course, great difficulty in the way; but if we properly educate the charitable-minded people in our great cities and towns concerning the need of such institutions, their great value in preventing the spread of the disease, there should be no greater difficulty in getting sanatoria and hospitals for the treatment and segregation of such patients than in getting hospitals for surgical cases such as abound in every city, almost in every large town, in the United States. The dispensary treatment as described by Dr. Otis is the next most feasible point in the treatment of the tuberculous poor, and when we succeed in having not only such dispensaries as that doing the work that Dr. Otis is doing, but sanatoria in the neighbourhood of the great cities, and hospitals, then we have begun in the right direction, and until we do that we are lamentably behind the advanced countries of Europe.

Dr. Beverley Robinson (New York): I should like to talk a good deal on some of the points brought out, but we have not the time to devote to this one paper; but I would like the permission of the President to make one or two points. There is a great deal in what the gentlemen have just said with which I agree, and much that I disagree with most absolutely. I am glad to see that my friend and colleague and former house physician, if you will allow me to say it, Dr. Minor, re-echoes my views exactly. The public have been put wrong, and I want the medical profession to put the public right again. This advance of so-called science, or even science, is given to making mountains out of molehills and of exaggerating the importance of things that have no real importance, and making out that we cannot accomplish certain good results without appealing to the charitable, broad-minded spirit of us all so constantly. Profession or not, men or women, we are all inclined to spend a lot of money for a very poor and inadequate return, in my humble judgment, when we sympathise with such movements. Sanatoria are doubtless all right for the few, but we cannot take care of the vast majority in that way. We must make our cities liveable, and we can thus get rid of a great amount of disease. Therefore once more, and in sitting down, I re-echo what Dr. Minor says. The medical profession is off, and it behoves the medical profession to think straight and do what I believe firmly to be the best for the vast majority of the poor who are suffering with tuberculosis.

THE DEATH RATE OF ACUTE PNEUMONIA.

BY THOMAS J. MAYS, A.M., M.D.
PHILADELPHIA, PA.

Much is written and spoken about the marked prevalence of pneumonia in this country. Both the medical and the lay press are competing with each other in picturing the enormity of this latest mortality development. We are asked to believe that this disease, which in former years conserved a comparatively ordinary death rate, has in recent years sprung into undue prominence—that it bids fair to become the most formidable life extinguisher of the age. Indeed, one authority* maintains that from 1860 to 1900 the death rate from pneumonia reached the colossal increase of more than 350·00 per cent. in the City of Chicago, and this in spite of the fact that the general death rate in that city diminished nearly one third in the same time.

It must be admitted that this is a startling and seemingly incontrovertible statement. But when one appeals to his own experience and to that of others who have likewise been in practice for thirty years or longer, it does not appear that on the whole there is such a striking increase in the number of pneumonia cases over those which were encountered years

* Editorial. *Journal American Medical Association*, January 24, 1903, p. 248.

ago. Yet it is alleged that statistics show differently, and it was this apparent contradiction between figures and experience that led me to look into the data of this disease.

Practically speaking, pneumonia is a perennial disease throughout the world, although its greatest fatality is in the winter season. Yet, in keeping with the law that the same causes always produce the same results under the same circumstances, it must be accepted that the cause or causes which underlie its development in one locality also underlie it in another. Taking for granted, then, that the intimate ætiology of this disease is the same everywhere, it is evident that the best way to obtain a true idea of its mortality is not only to gather statistics of one or two localities, but to obtain as large a mass of truthful figures from as many and as varied sources as possible. It must not be forgotten in this connection that, owing to their manifold and heterogeneous origin, it is quite obvious that no absolutely correct death statistics exist anywhere. This obtains especially in nearly all the States of this country, where, in fact, no pretension is made to furnish statistics except those of the census man, who makes a guess at them every decennium. From a long familiarity with the health reports of our large cities, and of the States which are herein utilised, I believe that on the whole they are as trustworthy as any statistics dealing with concrete social phenomena can be made. The figures on which this paper rests come from the Health Reports of Philadelphia, New York, Chicago, Boston, St. Louis, San Francisco, Buffalo, the District of Columbia, Richmond, Baltimore, Reading, Louisville, Rhode Island, and New Jersey, representing a total of over eleven million inhabitants, and in most instances cover a period of twenty-five years, from 1876 to 1902. In order to show the proper relational course of pneumonia to allied diseases, I have introduced a number of tables and

charts relating to the death rates of phthisis and heart diseases with which its own may be compared. By way of explanation it may be stated that as few figures are employed as is consistent with the elucidation of the object in view, that the death rate in each disease has been reduced to a per mille basis, and that each division line on the charts represents one-tenth of a mille. The black line represents phthisis, the red pneumonia, and the blue heart diseases.

Even a cursory view of this mass of statistics shows a disproportion between the number of deaths that occur before and after the latter eighties or early nineties. Closer examination shows that approximately more than 40 per cent. of pneumonia, more than 90 per cent. of heart disease, and about 29 per cent. less of phthisis occur after this period than before. This becomes still more apparent in the charts which are here submitted. In each of these, except that of Reading and of the district of Columbia, which show it a little later, there is a rise in the tracing of pneumonia and heart diseases, and a corresponding fall in that of phthisis, about the year 1880. Another point is brought out by the graphic method which is not so vividly conveyed by the figures, viz., that there are two sharp and pronounced elevations and immediate depressions in most of the tracings of pneumonia about the years 1890 and 1900. In fact, it seems as if 1890 and 1900, or thereabouts, are the points at which the pneumonia and phthisis lines cross or touch each other, and either run a parallel course afterwards, or the former rises above the latter.

In the chart for Philadelphia, No. 1, it is seen that the tracings for pneumonia and heart diseases almost pursue parallel courses from the beginning to the end. The increase in the death rate between 1869 and 1902 is 83·33 per cent. in both cases. The phthisis tracing, on the other hand, ascends

rapidly until 1882, then takes a downward course to 1897, and from this point it rises and shows an increase in its death rate of 7·24 per cent. during the last six years. The decrease in the number of phthisis deaths from 1881 to 1892 (ten years) is 22·58 per cent., and from 1891 to 1902 (ten years) it is 12·50 per cent., or in other words, the decrease is about 80 per cent. greater during the former than during the latter ten years.

The tracings for New York, No. 11, cover a period of thirty-seven years, and the annual average pneumonia death-rate for the first eighteen years of this period is 2·17 per mille, that of the last eighteen years is 2·94 per mille, or 34·10 per cent. greater increase in the latter than in the former period. The data for a complete tracing of deaths from heart disease are wanting in part, but so far as given they show no extraordinary increase. If the phthisis death-rate is computed in the same way as that of pneumonia, it will be found that this is 3·97 per mille for the first, and 2·94 per mille for the last eighteen years, or 25·94 per cent. greater decrease in the latter than in the former period.

In the City of Chicago the tracing of pneumonia, No. 3, extends over a period of forty-two years, 1860 to 1902, rises after the first year's record and reaches its high water mark in 1891, with a fatality 91·66 per cent. greater than in 1880. During the forty-two years it increases 350 per cent., which is much greater than that of any other locality comprised in this investigation. As a counterpart to this the deaths from heart disease computed in the same way as those of pneumonia, increased 450 per cent. during the same period. The tracing of phthisis shows marked diminution—rapid at first and more gradual afterwards. Thus the average decrease in the first decade, from 1860 to 1870 is ·82, and in the last decade, from 1892 to 1902, is only ·17 per mille; or 382 per cent. greater decrease in the first than in the last decade.

The tracing of pneumonia for Boston, No. 4, shows an increase of 88·23 per cent. from 1874 to 1893, and a decrease of 40 per cent. from the latter year to 1902. The tracing for deaths from heart disease shows some, but no noteworthy increase. The tracing for phthisis gives a rapid descent from 1882 to 1899, and from that point to 1902 a slight increase.

The tracing of pneumonia for St. Louis, No. 5, gives the usual spurt upwards in the early and later nineties, but shows no marked rise anywhere in its whole course from 1869 to 1901. The tracing for heart disease is incomplete. Barring its precipitous ascent in 1873 the phthisis tracing remains very nearly on one level until 1886, whence it gradually declines until 1899, after which a slight rise occurs for the remainder of the line.

The chart for Buffalo, No. 6, extends from 1881 to 1902. The pneumonia tracing retains about the same level until the precipitous rise in the nineties begins and ends, after which it pursues another but a lower level than before. The phthisis line maintains an average level until 1891, but in the next five years it decreases 40 per cent., while in the succeeding and last six years a slight increase takes place.

The chart for the district of Columbia, No. 7, covers a period of twenty-six years, from 1876 to 1902. The pneumonia tracing is peculiar inasmuch as there is a rapid and almost uninterrupted fall from 1878 to 1887—showing a decrease of 48·83 per cent. in the pneumonia mortality during that time. Then occurs a sudden rise until 1891, and from that point until 1902 there is a decline of 28·56 per cent. in its death-rate. The phthisis tracing is still more interesting. During the first four years it makes an almost perpendicular rise—swelling the death-rate 27·77 per cent. in that time, then it falls abruptly from 1879 to 1895, and gradually ascends again from the latter year to the end. The decrease from

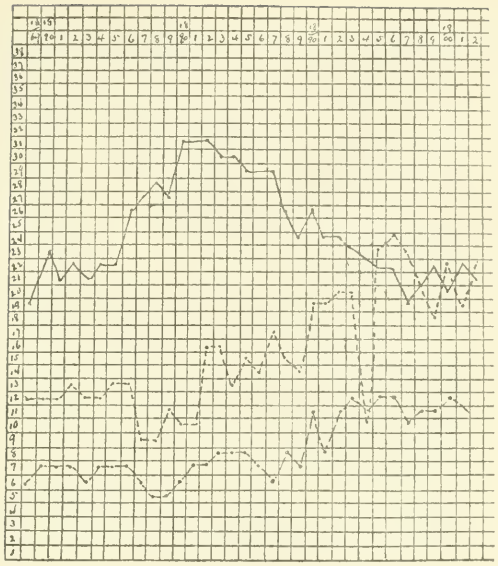


CHART I.—Philadelphia, 1869–1902.

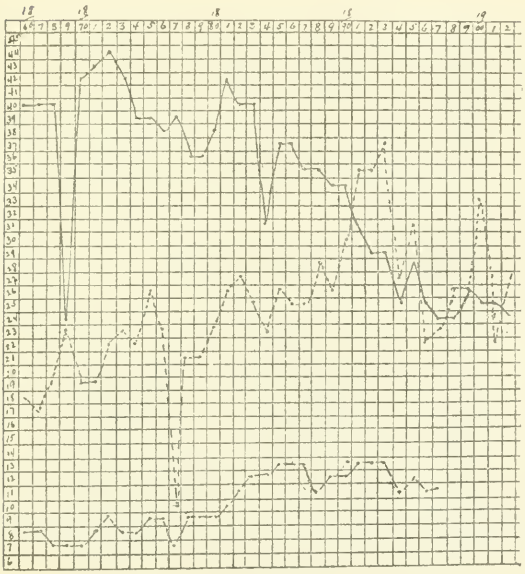


CHART II.—New York, 1869–1902.

Illustrating Dr. Mays' paper on the "Death Rate of Pneumonia." The black line represents phthisis, the dotted line pneumonia, and the broken line heart disease.

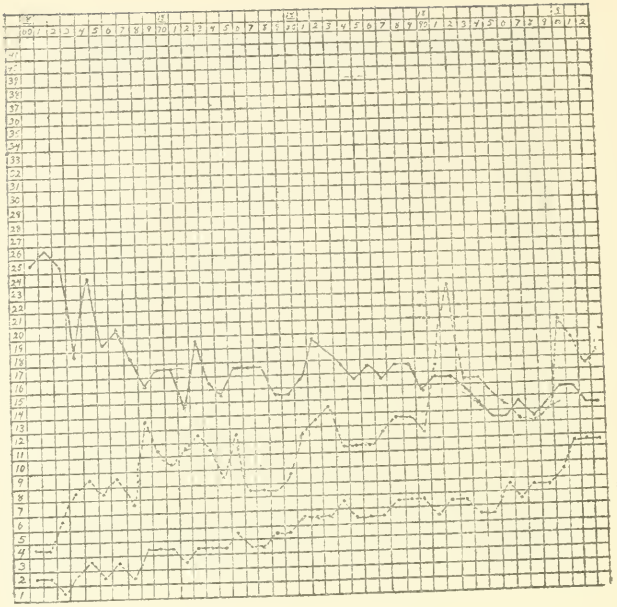


CHART III.—Chicago, 1860-1902.

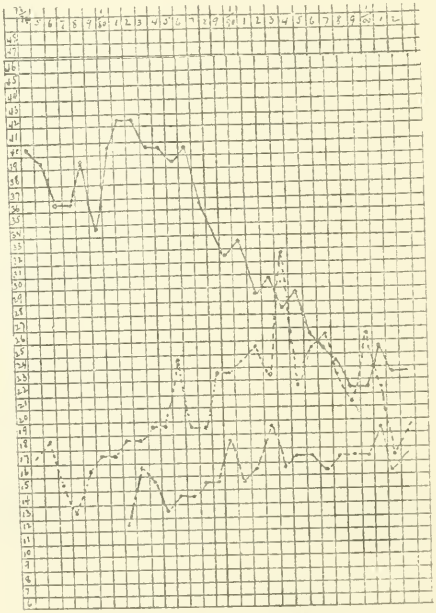


CHART IV.—Boston, 1874-1902.

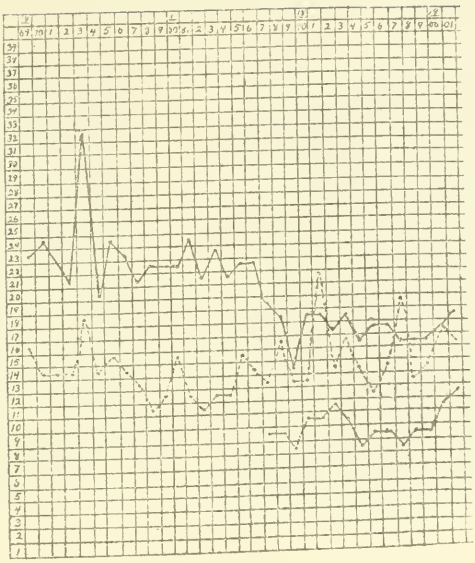


CHART V.—St. Louis, 1869-1902.

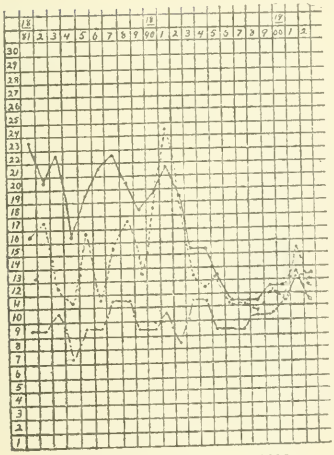


CHART VI.—Buffalo, 1881-1902.

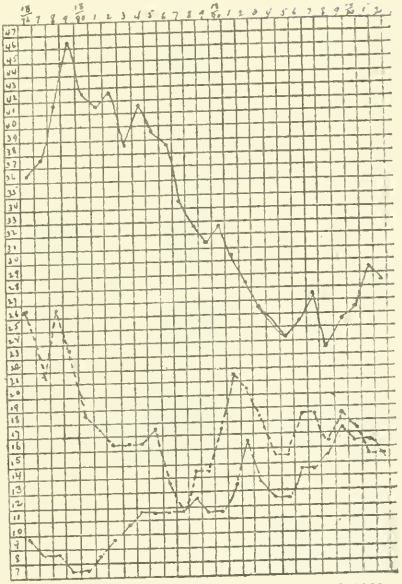


CHART VII.—District of Columbia, 1876-1902.

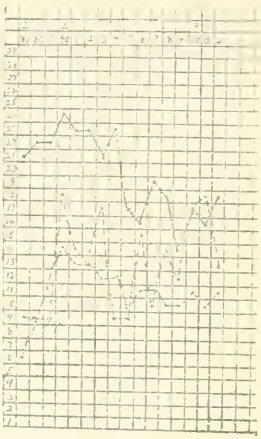


CHART VIII.—Richmond, Va., 1887–1902.

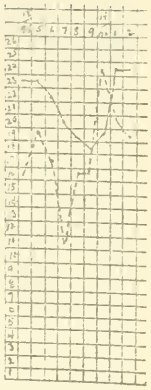


CHART IX.
Baltimore, 1895–1902.

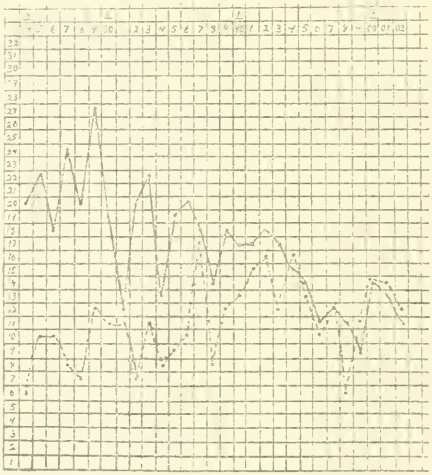


CHART X.—Reading, Pa., 1874–1902.

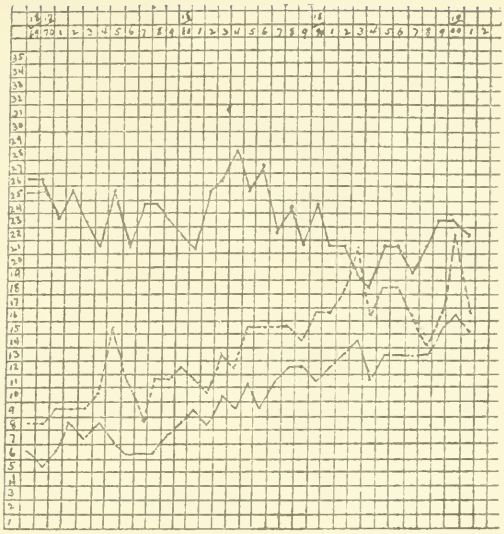


CHART XI.—Rhode Island, 1869–1902.

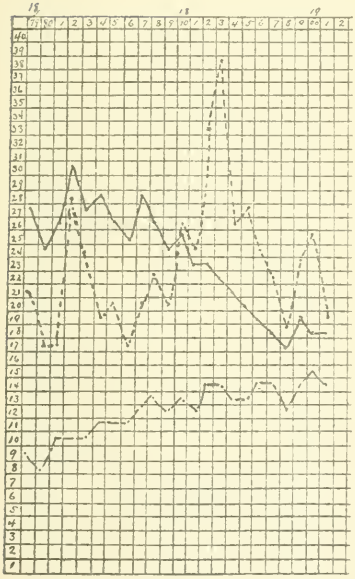


CHART XII.—New Jersey, 1879—1902.

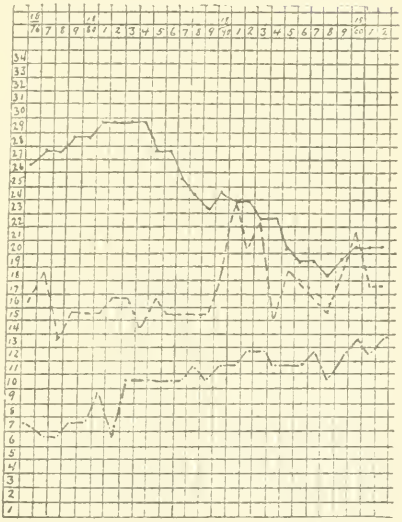


CHART XIII.—Composite chart of the death rate of pneumonia, phthisis and heart disease in Philadelphia, New York, Chicago, Boston, St. Louis, San Francisco, Richmond, Buffalo, District of Columbia, Reading, Baltimore, Louisville, Rhode Island, and New Jersey, representing a population of 11,008,106.

1879 to 1895 embraces a period of seventeen years, and amounts to 47·82 per cent., and of this diminution 29·92 per cent. occurs in the first eight, and 17·90 per cent. in the last eight years of this period, or a decrease of 59·47 per cent. greater in the first than in the last eight years. In the last seven years—from 1895 to 1902—the death-rate from this disease rises 15 per cent.

The tracing of the mortality of heart diseases ascends gradually from the fifth year until 1902, and the average difference between its first and its last four years shows an increase of 105 per cent. in the deaths from affection of this organ during that time.

Chart No. 8 represents the city of Richmond, Va., for sixteen years—from 1887 to 1902. The tracing for pneumonia makes about an even average from beginning to end, although in the last year there is a decrease of 27·21 per cent. The tracing for diseases of the heart indicates on the whole a slight increase in the causes of death from this source. The phthisis death-rate remains about the same until the year 1894—after which it rapidly declines until 1899, and from this point to the end—four years—it increases 28·56 per cent.

Chart No. 9 relates to the city of Baltimore and only covers a period of nine years from 1894 to 1902. The tracing which pertains to the death-rate of pneumonia shows the usual dash in the early nineties and also in 1900, and on the whole there is an increase of 21·76 per cent. of the mortality from this cause. Although in the last three years—1900 to 1902—there is a decrease of 27·22 per cent. From 1895 to 1899 the phthisis tracing shows a decrease of 21·73 per cent. in the number of deaths from this source, and from the latter year to 1902, the same increases 33 per cent.

The tracing of pneumonia in Chart No. 10, which extends over twenty-seven years and pertains to the city of Reading,

gives an increase in the death-rate from this disease 28·86 per cent. greater in the last than in the first half of this period. The phthisis tracing is exactly the reverse of this. The deaths from this source are 36 per cent. more frequent in the latter than in the first half of this period.

Chart No. 11 represents the State of Rhode Island for thirty-three years. The tracing of pneumonia rises almost continually from the beginning to the end, and indicates an increase of 100 per cent. in the death-rate of this disease during that period, and that for heart diseases has a similar ascent and shows an increase of 133 per cent. in the death-rate from this cause for the same length of time. In the case of phthisis there is a decrease in its death-rate of 11·53 per cent. from 1869 to 1880; an increase of 17·39 per cent. from 1880 to 1884; a decrease of 30·76 per cent. from 1884 to 1894; and finally an increase of 22 per cent. from 1894 to 1900.

Chart No. 12 represents the State of New Jersey and covers a period of twenty-three years. The acute spurt which occurs in the early nineties in the pneumonia tracings of nearly every chart herewith presented is especially prominent here, since it rises more than 50 per cent. over its base in three years. There is an increase of 80·95 per cent. of pneumonia from 1879 to 1893; and a decrease of 50 per cent. of the same from 1893 to 1901. From deaths due to heart disease there is an increase of 55·55 per cent. during the whole period. The tracing of phthisis shows some increase in the death-rate from this disease up to 1882, and from this period to 1898—seventeen years—there is a diminution of 36·66 per cent. in its death-rate, and from the latter year to the end there is a slight increase.

A composite chart built on the combined average death-rate of each city and State for each year gives tracings which

bring into prominence the common characteristics of each disease under consideration. Chart 13 represents the death-rate of pneumonia, phthisis and heart diseases of Philadelphia, New York, Chicago, Boston, St. Louis, San Francisco, Richmond, Buffalo, District of Columbia, Reading, Baltimore, Louisville, Rhode Island and New Jersey in a composite form from 1876 to 1902. The marked characteristic upward jump of the pneumonia tracings seen in the single charts around the early nineties and 1900, are well defined here in the same years. The total increase in pneumonia for the whole period is not quite 10 per cent. The total increase of deaths from heart diseases is 85·85 per cent. From 1884 to 1898—a period of fifteen years—the tracing of phthisis shows a reduction in the death-rate of this disease of 29·62 per cent., and from 1898 to 1902—the last five years—it gives an increase of 11·11 per cent.

In summing up the results of this investigation the following points seem to be fairly well established. First, there is no good reason for believing that pneumonia has gradually sprung into such prominence as to cause present or future alarm; for its highest death-rate occurred before 1896, and since that time it has declined 21·17 per cent. Compared with heart diseases as a death menace, if such a term is permissible, pneumonia ranks rather low; for in Chicago the latter increased 350 per cent., and the former 450 per cent. in forty-two years. In the district of Columbia there is a marked decline in the pneumonia rate during the twenty-six years, while the deaths from heart disease increased 105 per cent. in the same time. In New Jersey, during twenty-three years, the deaths from pneumonia increased 30·95 per cent., and from heart diseases 55·55 per cent. In the composite chart the total increase of pneumonia deaths is not quite 10 per cent., while those from heart diseases increased 85 per cent.

Second, that in a number of the above-named localities the phthisis rate diminished from the beginning of the record; that there is a reduction in all of them in this respect from the early eighties to 1898, and that from the latter point to 1902 there is a general net increase. Thus Philadelphia, St. Louis, the District of Columbia, Baltimore, Louisville, San Francisco and Rhode Island give a total increase of 117·17 per cent.; New York a decrease of 4·15 per cent.; while Chicago, Buffalo, Richmond, Reading and New Jersey neither increase nor decrease, leaving therefore, a net phthisical increase of 113·02 per cent. for the last five years, or between 1898 and 1902.

Third, that the natural average decrease in the death-rate of phthisis is between 2 and 3 per cent. a year. This is shown in the composite chart, and in all the other charts in which a persistent decline occurred for a number of years in succession.

On the whole we may therefore conclude that deaths from pneumonia are decreasing; that deaths from disease of the heart are increasing; and that deaths from phthisis decreased until five years ago, but have markedly increased since that time.

SOME COMPLICATIONS OF PNEUMONIA, WITH REPORT OF CASES.

BY THOMAS D. COLEMAN, A.M., M.D.
AUGUSTA, GEORGIA.

It is generally believed that the mortality from pneumonia has diminished little, if any, during the past century. Improvement marks the history of many diseases, some being almost eliminated, others reduced 5, 10, 15, 20 per cent., and more; even tuberculosis, that fell destroyer of the human race, is having its ravages curtailed, but pneumonia apparently resists all our efforts. According to the last census of the United States, the mortality from this disease not only equals, but surpasses that from tuberculosis, being 106·1 per 1,000 deaths. At the last meeting of the American Medical Association at Saratoga, Dr. Osler stated that the figures were appalling; that "in private practice, in hospitals, in jails, in barracks, in fields, and in camps, the mortality has always been the same, about 25 per cent.," and he wisely suggested that these figures should exact from physicians a closer study of the disease.

Dr. Wells, of Chicago, in a critical study of this subject, states that in a series of 359,797 cases there was a mortality of 21·8 per cent., and I assume that these figures represent a fair proportion. The figures presented by so many able observers from all portions of the globe, do not admit of dispute, but are susceptible of a degree of explanation, with

the frank admission at the outset that our treatment is as yet inadequate and unsatisfying. I think our habits and methods of diagnosis are more precise than at any age in the history of medicine, and cases are not only diagnosticated that in the past would have been overlooked, but they are more faithfully reported and preserved in the archives of societies and by municipal authorities.

This fact suggests that the percentages of mortality may still fall short of accuracy in private practice, for most of us must report deaths from pneumonia to the proper municipal authorities, and these figures may be used by statisticians; but how many of us report our cures?

A most potent factor, if not the most potent factor, in such an increase in the disease as exists comes from the marvellously rapid development of cities, with all their attendant crowding, and unsanitary conditions too numerous to mention, thus exposing the susceptible to the specific infection. Whatever the causes, the fact remains that we are confronted by an appalling mortality in this disease, and we owe it to ourselves and the human race to exercise our highest talents in its diminution.

An uncomplicated case of pneumonia is comparatively amenable to treatment, and the mortality showing is not bad, but the complications create sad havoc with our figures, and to these I wish to direct your attention.

The most common complication is pleurisy, so common, indeed, that it may almost be considered a part of the disease, for it occurs in all cases where the pneumonic consolidation reaches the surface of the lung. So frequent is it, that many observers regard the crepitant râle so characteristic of the disease as a pleuritic friction sound. Such pleurisy is usually of the dry plastic type and disappears with ensuing resolution. It may, on the other hand, be attended with effusion,

which is at times difficult of diagnosis, an aspiration being necessary to decide it. This adds greatly to the discomfort of the patient. Pleurisy occurring during the earlier stages of the disease is characterised by a more severe stabbing or cutting pain than is present in pneumonia without pleuritic involvement. Complicating pneumonia has been found to be purulent in about 1 per cent. of cases tabulated by Mezzoni. It occurs toward the close of the attack and attention is drawn to it by the firm unyielding resistance of the intercostal spaces, by the fact that the temperature remains remittent when the crisis should come, and there are the signs of septic intoxication, viz., irregular fever, sweats, feeble pulse, and great prostration.

Endocarditis. Other serous membranes are liable to infection by the specific microbe of this disease, and Osler has shown in his Gulstonian lectures that in 209 cases of malignant endocarditis, 25 per cent. occurred as complications of pneumonia. It is more apt to affect the left heart and to attack those with old valvular diseases. Tyson states that endocarditis may be suspected—(1) when the fever is protracted and irregular; (2) when signs of a septic condition arise, such as irregular temperature, with chills and sweat; (3) when embolic pneumonia developes; (4) when a loud cough murmur, especially a diastolic aortic murmur, developes in the course of the disease.

In autopsies on 100 cases Osler found endocarditis present in sixteen. The concurrent endocarditis may be simple or malignant.

Pericarditis occurs less frequently than endocarditis, is more apt to occur in children, and occurred in 5 per cent. of the 100 autopsies referred to. This condition may be determined by the friction rub occurring with or closely following the heart sounds, "increased dyspnœa, greater feebleness of the pulse, and gradual suppression of the heart sounds."

Myocarditis occurs occasionally and usually only amounts to cloudy swelling of the muscle fibres, but in rare cases these may undergo fatty degeneration. Pulmonary œdema and hypostatic congestion due to failure of the right heart to properly propel the blood through the lung is apt to develop. Abscess of the lung occurs in 4 per cent. of fatal cases of pneumonia. Gangrene of the lungs occurs in 3 per cent. of fatal cases. The expectoration in this latter condition is thin and profuse and fœtid, containing large quantities of elastic tissue, and Tyson's remark that "it is recognised by the sickening fœtor which pervades the whole ward, and which once met is never forgotten," is amply borne out by the following case, seen by me in consultation with Dr. A. C. Wade, of this city, and the notes on this case were kindly furnished by him.

T. J. B., white, male, aged 46, mechanic, while at work on November 14, 1902, was taken with uræmic convulsions; following the convulsion he remained comatose for five hours. Temperature in axilla, $101\frac{4}{5}°$; pulse, 140; respiration, 43. Urine drawn by catheter 3 ounces, dark coloured, with abundant sediment. On return to consciousness patient complained of pain in right side of the chest over the nipple, and marked dyspnœa was present; he was cyanosed. Following this patient developed cough with appearance of blood-streaked expectoration. Liver congested, conjunctivæ coloured, and large quantities of bile expelled from stomach; tympanitis marked. In twenty-four hours the expectoration was profuse, prune-juice coloured; temperature ranged from 102° to 103°: pulse from 120 to 140.

On physical examination the whole lower lobe of the right lung was consolidated. On the sixth day following the development of the trouble the expectoration began to lose its prune-juice colour and became offensive, enormous quan-

tities of purulent expectoration being brought up, with greenish masses through it, the odour being so disgustingly sickening that it was almost impossible to enter the room. Patient had no distinct chill after the initial one ushering in the pneumonia, but had frequent periods of sweating.

Patient died from exhaustion on the nineteenth day of the disease.

Diagnosis, pulmonary gangrene, complicating pneumonia.

Meningitis Osler regards as by far the most important complication of pneumonia, and he found it present in 8 per cent. of fatal cases. It is often overlooked by the physician, except in striking cases, where it is characterised by intense and persistent headache, rigidity of the ligamentum nuchæ and muscles of the neck and head, delirium followed by mental hebetude, deepening into profound coma. In all of the effusions resulting from inflammations of these serous membranes the *Diplococcus lanceolatus* of Fraenkel may be demonstrated microscopically. Among the rare complications of the disease may be mentioned *ante-mortem* clots described by Eichorst as ham fat clots; these occur rarely and are due to great feebleness on the part of the right ventricle.

Venous thrombosis is apparently an exceedingly rare complication, and Da Costa, in 1898, was able to collect only nine cases in medical literature. Five of these were in the right leg, two in the left, and two bilateral. Steiner, in the *Bulletin of Johns Hopkins Hospital* for June, 1902, was able to collect only thirty-eight cases in literature, with three additional cases, occurring in 500 cases of pneumonia treated at the Johns Hopkins Hospital. In the overwhelming majority of the cases under consideration the thrombosis appeared during convalescence, as occurred in the case presently to be reported by me; in only four cases did it occur during the course of the disease. In all instances one or both lower

extremities were involved; the left alone in sixteen cases, the right alone in ten cases, and both together in seven. Death occurred in nine, in five of which it was due to pulmonary embolism; recovery in twenty-five cases.

The following case occurred during my service at the City Hospital last autumn.

John Goodwyn, white, male, aged 17, mill hand, was admitted to the City Hospital on September 26.

Diagnosis, secondary anæmia. Patient fairly plump in appearance, but his skin was of a greenish-yellow colour; conjunctivæ and tongue pale.

On physical examination the lungs were normal, the heart was normal, except for a hæmic bruit; the liver and spleen were little, if any, enlarged, and the urine was pale and contained no albumen.

On October 7 the patient had a chill and the temperature rapidly rose to 102°, and on the following day to 105°. On physical examination the patient was found to have developed lobar pneumonia, the consolidation being limited to the base of the right lung. The pneumonic process spread from the lower lobe to the upper, and a crisis was not reached until the 19th, when the temperature dropped to 97°. During this interval the temperature ranged constantly from 103° to 105°, reaching $105\frac{8}{10}°$ on October 10.

Convalescence was now fairly established and for several days the patient continued to improve, when on the 23rd the left leg began to swell and the patient developed left phlegmasia alba dolens, the femoral vein being involved. The leg was encased in cotton batting. Supporting treatment was continued, and on November 1 the leg was apparently normal.

On November 5 the right leg was discovered to be enlarged, tender and white, and the same process was gone through with this leg. On the 12th this leg returned to its normal

condition, and from this the patient convalesced steadily, and passed an uneventful recovery.

I saw him four months ago; he had had no further trouble and was at work.

Cerebral and pulmonary embolism also occur in isolated cases, and parotitis, neuritis, croupous colitis, and jaundice are sometimes found. All authorities agree that acute nephritis is a rare complication. Viewed from one standpoint this is not especially remarkable, since nearly all of the complications considered occur in the middle or latter stages of the disease. One of the most important predisposing causes in pneumonia, as well as in Bright's disease, is exposure to wet, cold and changeable conditions of the atmosphere. Hence one would expect this complication oftener in the earlier stages of the disease. Perhaps this may be developed with closer study and more accurate reports of such cases. The following interesting case occurred during my service last autumn at the City Hospital, and serves to emphasise the fact that the urine should be closely watched during a case of pneumonia.

Clara Sellars, aged 12, admitted to the City Hospital October 11, 1901, with a well-developed case of pneumonia, involving the lower lobe of the right lung. Temperature on admission was 104°; pulse 140; respiration 40. The disease followed an uneventful course from this point, the patient apparently doing well until the 22nd, when, without any warning, the patient passed into uræmic coma; her temperature went up to $10,6\frac{2}{10}°$ and she died at 5.25 that afternoon.

When one reflects on the disproportionate mortality of pneumonia, not only from the disease *per se*, but from the number and severity of the complications to which the disease is subject, it should teach the lesson that in these cases, at least, eternal vigilance on the part of the physician is the price of the life of the patient.

BRIEF NOTE UPON THE TREATMENT OF LOBAR PNEUMONIA.

BY GLENTWORTH R. BUTLER, M.D.
BROOKLYN, NEW YORK.

THERE is, I fear, nothing new to be said concerning the treatment of lobar pneumonia. Yet a subject of such perennial, and unfortunately, also of such painful, interest is justly entitled to an occasional review.

There are few diseases in which the prognosis is so variable in the individual case. Recovery will occur in some, not only without intelligent treatment, but in spite of a glaring lack of care; death takes place in others no matter what measures are employed; and in a third group the outcome is apparently dependent upon the timely and energetic use of accepted therapeutic methods. To increase the relative size of the last group is the object of all internalists at the present day, an object which unfortunately seems no nearer of attainment than it was twenty years ago, as the general mortality varies little from decade to decade. Moreover the incidence of the disease is increasing, a condition attributed with much reason to the prevalence of epidemic influenza.

There is as yet no specific—a remedy which cures or tends to cure a particular disease—for lobar pneumonia. The reports concerning anti-pneumococcus serum are conflicting, and the very fact that there is no unanimity of opinion con-

cerning the results obtained by its use constitutes an immediate presumption against its specificity. Moreover the statistics relating to therapeutic methods in this disease are peculiarly liable to error because of the great natural variations in the mortality rate, dependent, as these variations so largely are, upon three conditions. These conditions are first, age: second, the presence of previous degenerative or other disease, particularly of the heart and kidneys; and third, the varying virulence of the infective agent in the given case, upon which, in conjunction with the resisting power of the individual, depends the degree of the toxæmia, which is the most important factor in the mortality. In all likelihood the specific treatment for lobar pneumonia will be found in the discovery of an antitoxin which will counteract the toxæmia of the disease, although it is contended, and not without reason, by some, that the disease is not a bacteriological unity and may be caused by other pathogenic organisms than the pneumococcus of Fraenkel. If this contention be true the problem of the discovery of suitable mixed antitoxins becomes complicated and uncertain. Another source of error is the personal equation of the advocate of a new method of treatment which tends naturally and inevitably to paint in too favourable colours the results of the particular procedure to which he has given much time and thought. To few of us is given the absolutely calm and serenely judicial frame of mind which is so necessary in arriving at a clinical therapeutic truth. An absolutely unbiassed judgment is much more readily reached in the laboratory than when dealing directly with the supreme interests of human life and death.

Another fault in considering the treatment of pneumonia lies in an insufficient appreciation of the very considerable natural variations in the duration of the disease. I have seen at least three cases in which there was chill, high fever,

and rapid respiration on the first day, marked physical signs on the second day, followed by a rapid crisis and recovery on the third day; a larger number of four and five day cases, and a certain proportion in which the termination, either by crisis or lysis, was postponed until the twelfth day and longer. As it is quite impossible to foretell the probable duration of the individual case the claims of certain over-enthusiastic observers who profess to have aborted the disease must perforce receive the Scotch verdict, "not proven."

Few diseases require a larger number of cases to furnish reliable therapeutic data than lobar pneumonia, owing to the variable elements already considered, which enter into the problem. Statistics to be really trustworthy must be based upon thousands, rather than hundreds, of cases, all submitted to the same treatment, under proximately similar conditions. If we had figures concerning pneumonia, such as we have regarding the hydriatic treatment of typhoid fever, we should be in a position to make some valuable therapeutic inductions.

It must not be supposed that this paper is intended to advocate therapeutic nihilism. On the contrary, although it would be absurd, in the present state of medical art, to speak of *the* treatment of pneumonia as we speak of *the* treatment of diphtheria, malaria, syphilis, and rheumatic fever, yet it would be not only absurd, but criminal to allow a grave case of pneumonia to sink to a fatal termination without the energetic, and if necessary the heroic, use of remedies and measures which have, so far as human judgment can determine, more than once turned the scale in favour of life.

In considering the therapeutic management of the patient with pneumonia it is convenient to consider first the mild and uncomplicated, second, the severe or complicated, cases.

The first group embraces those who are not the subjects of previous degenerative diseases, and who do not show notice-

able evidences of toxæmia or cardiac weakness; the second comprises those with diseased heart or kidneys; who are aged; or who present as symptoms delirium, coma, subsultus or tremor, cyanosis, tympanitis, rapid weak heart, in short, the typhoid status. Unfortunately a case in the first group may of course by the development of grave symptoms shift into the second class.

There are certain routine measures and precautions, mainly non-medicinal, which are required in every case, be it mild or grave. The room should be especially well-ventilated in order that the labouring lungs may receive air containing the maximum natural percentage of oxygen. No one ever "takes cold" while the body temperature is much above the normal or is harmed by breathing pure cool air, provided the body, and if necessary the head, is protected. Nothing is gained by the over-load of bed-clothing so commonly seen, and personally, I long ago discarded the pneumonia jacket in this form of the disease, unless when especially requested. Too much bed-clothing, as well as the swathing of the trunk in cotton, tends to keep the fever at a somewhat higher point than it would otherwise register, and adds materially to the discomfort of the patient, both of which are distinctly detrimental. The body clothing should be of medium thickness and so arranged, by splitting part way up the back if necessary, as to permit physical examination with a minimum of disturbance to the patient. Undue physical diagnostic zeal is to be avoided. Absolute rest in the recumbent position, together with the use of the bed pan and urinal, is to be insisted upon, barring exceptional cases.

The free and regular giving of water, plain or mineral, for the important purposes of eliminating toxins and of keeping the renal tubules flushed out, is of great importance. For this purpose also 8 to 16 ozs. of normal saline by the-rectal route is often of service.

The diet should be that usually given in fever, comprising milk, clear or diluted, flavoured or not, perhaps predigested; plain ice-cream and junket; broths of beef, mutton, chicken: oysters and clams; tea, coffee, or weak cocoa, if desired; grape juice, orange juice, lemonade, ginger ale, and fruit ices; albumen water and egg-lemonade, and if necessary some of the proprietary liquid foods. One or two ounces of lactose daily, tasteless and easily soluble in most fluids, is a really helpful food, and may furnish many needed calorics.

Medicinally at the onset of every case a dose of calomel is of unquestionable benefit; so also a dose of 7 or 8 grs. of quinine, to be repeated the following day, given preferably by the hypodermic method. The carbonate of creasote is another remedy in which, together with some other observers, I have reason to feel a certain degree of confidence. This confidence is based, not upon personal statistics, since these do not embrace sufficiently large numbers, but upon observation of the general course of the disease in about forty cases, as compared with those seen in previous years, which were not put upon the routine use of this drug. I cannot say that in any case the duration of the disease was lessened, but as a rule it tended to run a milder course, the temperature curve instead of remaining persistently high, dropped a little from day to day until at the time of crisis it had but a comparatively slight distance to fall to the normal or below. Moreover there was apt to be a distinct diminution in the intensity of the toxæmic symptoms, less delirium, less tremor, less cardiac weakness, and not so much meteorism. While it is impossible to believe that creasote acts as a germicide in the blood and tissues, these results, if confirmed by sufficient additional observation, are suggestive of a possible antitoxic action of the remedy. Pain should be relieved, preferably by the use of a mustard draft, poulticing, or the ice-bag; using

also, if necessary, morphine hypodermically or Dover's powder by the mouth, in as small doses as are compatible with easement of the pain. Occasionally, not often, a tight chest bandage is efficacious. Cough, if irritating and unproductive, may at times be moderated by steam inhalations of menthol and benzoin. Morphine and Dover's powder are many times necessary, but the use of narcotics is to be dispensed with if possible. Personally I have not been pleased with the use of heroin.

Nothing more than the measures just outlined will be required in the milder cases. In considering the management of the graver cases it is convenient to take the special symptoms which may need further interference, viz., delirium, hyperpyrexia, tympanitis, cyanosis, weak heart and pulmonary œdema.

Delirium, restlessness and *persistent insomnia* may need the use of one or more of the following: trional (10 to 25 grains), bromides (30 to 60 grains), and small doses (3 to 5 grains) of Dover's powder, chloral (10 grains) cautiously, camphor (3 grains) at intervals of three to six hours, hyoscine hydrobromate (gr. 1 in 100) combined with morphine (gr. $\frac{1}{8}$ to $\frac{1}{4}$) hypodermically, and the ice-bag to the head.

Hyperpyrexia.—Unless the temperature is continuously at or over 105° it is probably not worth while to attempt to lower it. The hypodermic use of quinine is helpful; so also the use of the ice-bag to head and chest. The employment of the cold tub in pneumonia is unjustifiable, except occasionally in children, but the cold mitten rub has given excellent results not only in reducing temperature, which perhaps is a minor matter, but also because of its tonic action upon the nervous system. Required for this application of water (details important) are: a rather rough bath mitten, a vessel holding a gallon of water reduced to a prescribed temperature

by ice, a rubber sheet, a linen sheet, a blanket, and a couple of towels. The rubber sheet covered by the blanket is placed under the patient, the body clothing removed, and the sheet laid over him. The face, head and neck are wetted with cold water, or, in women, a wet napkin placed over the face. The front of the thorax is then uncovered, and the nurse, dipping her mittened hand into the water, rubs the surface vigorously until it is well reddened, frequently re-dipping the mitten in the water. When a good reaction is secured the thorax is quickly rubbed dry, and the back similarly treated. The extremities may or may not be gone over in the same way according to the height of the fever and the condition of the patient. The mitten rub may be repeated at intervals of from three to six hours when the temperature remains persistently at 105° or more. For the first rub the water may be at 85°, the second 80°, the third 75°, subsequently not below 65°.

Tympanitis is an extremely undesirable occurrence because of its mechanical interference with the action of the diaphragm and the heart. It should be carefully watched for and endeavours made to prevent or lessen it. It is probably less likely to appear when creasote carbonate is regularly given. Cutting down the nourishment, not the water, to a half or a quarter of the amount which is being taken, or stopping altogether for twenty-four hours, is advisable, so also is the giving of a moderate dose of calomel and soda. Enemata, plain, or containing turpentine, or milk of asafœtida, or musk, or the use of the rectal tube, operate, in large degree mechanically, to remove the gas when once present. To stimulate the muscular coat of the bowel to contract, the following are useful: momentary intermittent rubbing of the abdomen with an ice-water cloth; the administration of a medicinal enema containing 20 grains of the bisulphate of quinine and $\frac{1}{50}$ grain

of atropine, or the giving of half these doses by hypodermic; and the $\frac{1}{130}$ of a grain of eserine sulphate by the mouth every four to six hours. The latter has proved especially useful.

Cyanosis, when arising from restriction of the respiratory movements caused by pain, is lightened by relief of the latter; and when due to cardiac weakness or pulmonary œdema requires treatment of the special cause. Personally, I believe in the use of oxygen, in spite of many contrary criticisms, not because it can lay the least claim to be a specific, but for the reasons that when properly given it has in a majority of cases lessened cyanosis, slowed the respiration, and afforded a distinct sensation of well-being to the patient—all of which, although evanescent, cannot fail to have some bearing on the possible termination of a critical case. The ordinary inhaling mouth-piece should invariably be replaced by a glass funnel of 3 or 4 inches diameter, which is held by the nurse, an inch or so away, over the nose and mouth. It is barbarous to expect a dyspnœic patient to hold a mouth-piece between his teeth or to have a rubber tube inserted into his nose. With the funnel the gas can be given while the patient is asleep, without rousing him. It should be given for two to three minutes at intervals varying from ten minutes to an hour, according to the indications. Small doses at frequent intervals are best. It is well to direct the nurse to allow the bubbles of gas to come at about the rate of 150 per minute, thereby avoiding useless waste of a somewhat expensive commodity.

Cardiac weakness is perhaps the main channel through which life runs away in pneumonia. "Circulatory weakness in the early stage of this disease is in all probability due, for the most part, to the depressing effect of the toxæmia on the central vaso-motor apparatus; in the later stages and during convalescence, to acute myocardial disease. The pulse becomes frequent, small, easily compressible, often unequal

and irregular, or a beat may occasionally be missed. In rare instances it is abnormally slow. The first sound of the heart loses its muscular quality, and is low, muffled, and short. The aortic second sound is weak, the pulmonary second sound may at first be accentuated, but later loses strength. A soft systolic murmur, mainly over the left half of the præcordial area, frequently developes. The physical signs of dilatation, in varying degrees, are present. Syncopal attacks, restlessness, apathy, low delirium, and free sweating may be noted. Evidences of hypostatic congestion, and albuminous urine with occasional casts, are of not infrequent occurrence.

"To meet the indications in the condition under discussion, strychnine, the muscle energiser and central vaso-motor stimulant, is a remedy of the first value. It should be given at frequent intervals and in doses proportional to the urgency of the indications, gr. $\frac{1}{40}$ to $\frac{1}{20}$, or even more, every two hours. Like all remedies of this class it should be given hypodermically if prompt action is desired, or if there is the least doubt as to its absorption by the stomach.

"Next to strychnine is caffein, either in the form of the citrate, or better, as strong black coffee. One to two ounces of the latter, with or without a teaspoonful of spirits, may be given every two or four hours."

Brandy, whiskey, the stronger wines, camphor, and aromatic spirits of ammonia, are most useful adjuvants to strychnine and caffein. Digitalis and nitroglycerin should be given in full doses. Strophanthus and spartein may be freely used. An occasional dose of atropine and bisulphate of quinine, by hypodermic, does good service, and the rectal administration of strong coffee with whiskey, or an emulsion containing 15 to 30 grains of musk, are not to be forgotten in pressing cases. The possible usefulness of the powdered

suprarenal or its active principle is to be remembered. Swathing the thorax in flannel wrung out of hot mustard water, one or two tablespoonfuls to the quart, will unquestionably often strengthen the heart action and give considerable subjective comfort through the cutaneous stimulation produced thereby. The use of morphine will accomplish results obtained by no other drug. In small doses, $\frac{1}{50}$ to $\frac{1}{16}$ gr., repeated or increased according to its action in the particular case, it quiets and soothes the patient, and steadies and improves the action of the heart in a most satisfactory manner. Especially if constipation, flatulence, or œdema is present the giving of calomel 5 to 10 grains, and compound jalap powder 15 to 30 grains, may have a marvellously good effect; or a full dose of some saline may be substituted. No matter how serious the condition, one should seldom hesitate to unload the portal circulation in these cases.

The subcutaneous administration of a pint or two of normal saline solution is a resource not to be neglected in grave cases, as there is good evidence in its favour.

Pulmonary œdema, when present, demands in particular repeated dry cupping, hot mustard fomentations, calomel and jalap, large doses of nitroglycerine, moderate doses of atropine, and the free use of oxygen.

In reading over the foregoing recommendations there arises a strong suggestion of therapeutic frenzy, which is perhaps unavoidable when a deliberate attempt is made to collate the sadly inefficient resources of medical art in the treatment of this disease. The judicious man will constantly endeavour to carry through the individual case with watchful expectancy, and the least possible of meddlesome therapeutics. He will see to it that the patient's strength is not wasted by too frequent disturbances for the taking of food, drink, or medicine, or the making of applications, and that sufficient

time is allowed for sleep. A little attention devoted to the daily schedule, in order to combine and re-arrange its various items, will rebound to the benefit of the patient. Finally, while giving as little active treatment as the case will allow, he will not hesitate to employ the most active and vigorous treatment when it seems indicated. It is neither right nor humane to sit with folded hands beside a grave case of lobar pneumonia without employing every measure which clinical experience has proved to be of value, even slight, in turning the patient toward life at the parting of the ways.

DISCUSSION ON PAPERS BY Drs. T. J. Mays, T. D. Coleman, W.F. R. Phillips, and G. R. Butler.

Dr. Delancey Rochester (Buffalo): I have been very much interested in these papers and naturally the last one is the one that raises us to our feet. In the matter of therapeutics of a given disease, when there is no specific, there will naturally be difference of opinion, but it has seemed to me that to formulate a plan of treatment for a disease for which we have no specific we should study carefully the disease itself as it exists, particularly a self-limited disease like pneumonia, and note nature's way of bringing about recovery, and note also the particular way in which the patient dies, in order that we might, if possible, imitate nature's mode of recovery and prevent the occurrence of death. When studying cases of pneumonia we find that nature causes them to recover at the time of the crisis by a profuse sweat. It is therefore apparent that the toxæmia is relieved by this method of elimination through the skin, and sometimes we have in addition a critical diarrhœa as a further eliminative process, so that nature's method of recovery is to get rid of the toxins through the avenue of the skin or bowels, or both, thus pointing the way for us to get rid of the poisons which we know to be present in the blood. If the patient dies he dies almost always through failure of the heart or through some complication, therefore it is necessary for us to support the heart throughout the disease, and to meet the complications as they arise. Some years ago I presented a paper to the therapeutical section of the American Medical Association on this subject

of treatment of pneumonia, reporting about 125 cases, as I remember. Including all cases, young and old and alcoholic, and those that came under observation after a sickness of two weeks, the death-rate was 10 per cent.; excluding those that came under observation too late in the disease for the treatment to have any effect, but not excluding those of old age, the death-rate dropped to 4·4 per cent. The plan that seems advisable is as follows: I agree most heartily with Dr. Butler in his suggestion as to the use of calomel and a saline at the beginning of the disease, and I further carry that on by persistently opening the bowels every day with a saline laxative, which I think produces a very good result. The most important thing is a hot mustard foot bath given regularly in the bed every four hours; this can be done easily without disturbance to the patient, and it produces a copious sweating; the foot-bath is followed by an alcohol rub to keep the sweating from continuing too long. Always support the heart by strychnine and do not use digitalis.

Dr. Judson Daland (Philadelphia): I am of the opinion that the high mortalities quoted for pneumonia are from hospital and not private practice. There is one simple point that I desire to emphasise in regard to pneumonia, and that is that frequently in severe cases death occurs through the heart as mentioned by Dr. Rochester. I think this is a most important truth to be constantly borne in mind in the treatment of this disease. Poultices and cotton jackets should be excluded, not only in order that frequent and thorough physical examinations may be conducted with the least disturbance to the patient, but because they exert no beneficial influence over the pathological process. In this disease the coagulability of the blood is very great, so that given a weak heart, cardiac thrombosis is probably one of the common causes of sudden death. This condition can often be anticipated, and therefore the action of the heart should be carefully and frequently studied. It seems to me that in this condition venesection is most important and most urgent and the existence of a weak pulse at the wrist is no contra-indication to the removal of from 16 to 24 oz. of blood. We must recollect that the small pulse at the wrist often means simply an excessive amount of blood in the venous side, and is an *indication* for venesection. The administration of alkalies, preferably in the form of natural alkaline spring waters, is of benefit, and they also diminish the coagulability of the blood. Only a moderate amount of broths should be given, only sufficient to supply the body with the salts that are required and are so necessary; a strict milk diet also lessens the coagulability of the blood and is valuable. I desire to state further that I am very much in accord with Dr. Butler as regards saline and calomel, not only in the beginning but throughout the course of the case, as suggested by Dr.

Rochester, in order to secure free movements every day. The careful study of the heart is, however, most important, and the indication gleaned in this manner, when met, sometimes averts what would be otherwise an inevitable fatal termination.

Dr. W. Jarvis Barlow (Los Angeles): A word about the lowered death-rate of uncomplicated cases in Southern California. As we do not have perpetual summer there, as is sometimes thought, we do see some cases of pneumonia during the winter months, and it is of the type of the disease I wish to speak. I seldom come across the serious pneumonia as seen in the colder climates. The type seems to be more often a part of a lobe that is affected, a half or a third of a lower lobe. These go through the same course as the serious cases, except that the constitutional symptoms are less severe and the crisis not as sharp. I think this will be borne out by the testimony of other physicians in that section of the country, as well as the fact that any type of the disease occurs infrequently. The old-fashioned serious pneumonia I seldom come across. Perhaps the lowered death-rate is due to this.

Dr. Egbert Lefevre (New York): In regard to the treatment of the so-called cardiac failure, I have made some study of cases of pneumonia brought to the hospital, and also in private practice, in relation to the blood pressure in these cases and the question of drugs used to control the same. I find that these cases may be divided into two great classes, namely, those in which we have a true cardiac failure due to weakness of heart muscle, and those cases where the apparent failure of the heart is in reality due to vaso-motor paralysis and dilatation of the blood-vessels. This collapse of the general vascular system is probably caused by the direct action of the toxins on the vaso-motor centre. The blood pressure shows this very distinctly when taken by means of the Gaertner or Riva-Rocci instruments. The vessels are widely dilated, and as a result we have a rapid and irregular heart and a loss of tension in the whole arterial system. The first sound of the heart loses its distinct character and becomes very similar to the second sound. These cases react quickly to drugs that act upon the medullary centres. In the other class, where the heart itself is primarily affected, I find that stimulants which act directly upon the heart produce the best results, such as the digitalis group for instance, or preferably strophanthus. Studying the cases from this standpoint has brought new light to me regarding the use of nitrites in the treatment of pneumonia. There is at present a craze for inordinate doses of the nitrites and nitro-glycerine for combating cardiac failure in these cases. The habit has been formed of giving every case of pneumonia or other infectious disease large doses of nitrites as routine practice. In some cases where death was

due to vaso-motor collapse these drugs were given, and I firmly believe hastened the end. The use of these drugs has also demonstrated the fact that when they are employed in pneumonia we have a much wider variation of blood pressure, as they temporarily reduce the tension, giving for the time being a pulse that seems to be stronger, and then, as their effects pass off, the heart is again embarrassed by a greater tension than was present before their use. In regard to the other cardiac stimulants, I have largely discarded the alcoholic and substituted therefore the liquor ammonii acetatis.

Dr. John W. Brannan (New York): Dr. Butler has made reference to statistics published by enthusiastic observers showing a very low mortality under special lines of treatment. I had a personal experience some years ago in endeavouring to secure the same results by following the treatment recommended in a paper published in the *New York Medical Record*. I was asked to try it in my hospital practice if I had the opportunity. This physician had used it in a large country practice, and had treated some 150 or 160 cases in this manner. He reported all his cases, including old and young alike. His previous mortality had been about 20 to 25 per cent. for all cases, and this was reduced to about 5 per cent. He took all cases as they came, although of course the treatment resulted better in the earlier stages. His argument was expressed in scientific language. He claimed that in pneumonia there is a congestion of the lungs, and that the first indication is to remove that congestion. This he accomplished by diaphoresis, and his method was as follows: He took several bricks, immersed them in hot water, wrapped them in hot blankets and then placed them around the patient, and he claimed that under this treatment profuse diaphoresis was produced, and the temperature fell to normal within twelve to thirty hours, and all other symptoms improved in like manner, thus placing the patient practically beyond the crisis. The treatment seemed so simple that in the following winter I determined to give it a trial. I used it in Bellevue Hospital in five cases of ordinary severity, two or three being alcoholic. In the first case when the hot bricks were applied the temperature, instead of going down—I followed directions in every detail—rose to 108°. The house physician, using perhaps better judgment than I had done, at once applied cold alcoholic baths and brought the temperature down again, as also the pulse, which was very high. The patient recovered. In the second case the temperature went up to 109°; the same thing occurred and it was brought down again by cold, and the patient eventually recovered. In the other cases the result was about the same. One only died, and in that the temperature was as high as 110° and all the other symptoms were equally unfavourable. We thus had a mortality of 20 per cent.

in that limited number of five cases. I reported these cases at a meeting of the Bellevue Hospital Alumni Association, and stated that this was probably another instance in which a line of treatment results so much better in the hands of the person who developes it than with anyone else. In time I received a letter from this gentleman, who proved to be a graduate of Bellevue himself, and he thanked me for, as he said, not having "roasted" him. He stated that later on he found that the treatment did not result so well in advanced cases and he asked whether I had seen my cases early. I had not. We do not usually get these cases early in Bellevue Hospital—they were probably from three to five or six days old when they came under observation. One of the gentlemen who discussed my paper said he thought it was fortunate that the mortality was not higher than it was, inasmuch as I had added heatstroke to the original disease.

Dr. Thomas Darlington (King's Bridge, N.Y.): There is one point that I would like to call attention to and that is, speaking of treatment by means of nitro-glycerine as a stimulant, and also the use of ammonia as a stimulant, that ammonia and nitro-glycerine are absolutely incompatible, and yet there are many physicians who use them together in cases of pneumonia. Some experiments made a few years ago in cases of poisoning from nitro-glycerine in dynamite showed that there was a decomposition resulting when these two were combined. It is therefore evident that when given together if there is any effect whatever one must be in excess of the other, and to this the effect is limited.

Dr. H. L. Elsner (Syracuse, N.Y.): In a paper read before this body several years ago I tried to impress the idea which Dr. Lefevre has just advanced. It is a well known fact, proven clinically and experimentally, that the pneumococcus toxin paralyses the spinal centres—in turn vaso-motor paralysis results. It is strange therefore that many still persist in adding insult to injury by administering nitro-glycerine and the nitrites indiscriminately in the treatment of the cardiac weakness of pneumonia, dilating the vessels still further; adding extra work to a tired heart and robbing the heart of the assistance which is offered by well-regulated arterial tone. There are cases of arterial sclerosis in elderly people with pneumonia, with abnormally tense arteries, where the arterial wall offers monstrous resistance to the heart where arterial tension is high, in which nitro-glycerine may be given with advantage, but these are exceptional cases. In all cases our care must be for the right heart; this needs stimulation and protection, while the left half of the heart must not be forgotten. Spartein, used in sufficiently large doses, often does yeoman's service. As a rule too small doses are given to the disadvantage of the patient. Adrenalin and suprarenal extract, I have

repeatedly demonstrated by the use of the sphygmomanometer, act as heart tonics increasing the arterial tone and pressure, and I believe we have in these the very best heart tonics which can be used, and that all cases will do better for the early and persistent administration of the products of suprarenal activity. This is a food which will save many lives. The ammonium preparations and diffusible stimulants are indicated in all cases of cardiac failure, but they must be properly and persistently given at short intervals because of their evanescent effect. Pneumonia justifies polypharmacy; persistent effort on the part of the doctor and nurse during every moment of the illness of these patients will often bring its reward in unexpected and brilliant results.

Dr. S. E. Solly (Colorado Springs, Colo.): Concerning the effects of breathing cold air during an attack of pneumonia, I will speak briefly of a case that is interesting in this connection. A young girl suffering with chronic fibroid phthisis went to a company in a crowded over-heated room and afterward rode a considerable distance in an open street car, the weather being cold. As a consequence she had a chill and pneumonia ensued. She was accustomed to sleep on an open porch, and when the pneumonia appeared her mother wanted to take her indoors, but she begged and prayed to be allowed to remain there, of which I approved. She went through her pneumonia successfully on the porch, always protesting if any attempt was made to shield her from the air by screens, even when it snowed. The important precaution to take for a patient sleeping on a porch is to keep the body warm in bed, and this can always be done by the wearing of flannel, having sufficient blankets underneath as well as over the patient, and if necessary using hot water bottles, or better still an electric heating pad to which the current can be turned off or on without getting out of bed; but admitting the cold air freely to the lungs is almost always beneficial.

Dr. G. R. Butler (Brooklyn, N.Y.) said: I have nothing to add to what has been said, except to say that I regret that my paper was so long that it was impossible to read the portion which dealt with the most important complication of all, that is, the weak heart. It gives me much pleasure to have heard what the gentlemen who participated in the discussion have said in regard to the heart and the treatment of cardiac failure, because it is substantially in line with what is advocated in the unread half of the paper. I have, perhaps, seemed to insist a little too strongly on the importance of treatment in pneumonia, but it was written while still under the impression derived from certain consultation cases. The physicians in attendance were therapeutic nihilists, and to my mind their patients were being left to drift to death without a finger lifted to prevent. Under proper

therapeutic treatment recovery took place, and it was while labouring under a very vivid recollection of these cases that I wrote the paper.

Dr. Thomas J. Mays (Philadelphia): I have nothing to add in regard to my paper except this: that the statistics on pneumonia are very surprising to me from what I read in the newspapers and public press in regard to the increase of the death-rate of this disease. In passing I would like to say something as to the treatment of pneumonia so far as it related to my own experience. I believe that we overrate the treatment of the heart in pneumonia. As between the lungs and the heart the heart is biologically the older organ of the two, and therefore the most resistant, and the lungs are the least resistant to disease, therefore death usually comes through the lungs. In all deaths that come from either heart or lung sources, as for instance in chloroform or ether narcosis, the lungs invariably stop first. It has been demonstrated repeatedly by various experimenters on respiration and circulation that the lungs are the first to cease moving, and that the heart sometimes beats on for an hour, two or three hours perhaps, after the lungs have ceased to respire.

THIOCOL IN THE TREATMENT OF CROUPOUS PNEUMONIA.

BY E. FLETCHER INGALS, M.D.
CHICAGO.

THE composition of thiocol (potassium guaiacol sulphonate, Roche) is shown by the formula $C_6H_3CH\ OCH_3SO_3K$. It occurs as a white, micro-crystalline, odourless powder, having a faint bitter saline taste. It is readily soluble in water, and dissolves also in diluted alcohol, but it is insoluble in ether or in fatty oils.

Having used creasote, guaiacol and similar remedies extensively in the treatment of pulmonary tuberculosis, I was at once impressed with the value of thiocol, when I was assured by the manufacturers, who have a world-wide reputation for skill and integrity, that it would yield for absorption when taken into the alimentary canal, 70 per cent. of guaiacol, and that it might be given in large doses without disturbing the stomach. I immediately began its use with tubercular patients and quickly found that if given at first in a dose of 5 grains after eating the dose might be rapidly made $2\frac{1}{2}$ grains to 5 larger each succeeding day until the patient could soon take 25 to 35 grains or more, after each meal, without any disturbance of the digestive organs.

Carbolic acid and creasote have been so highly lauded in the treatment of pneumonia that it seemed to me judicious to try the effects of thiocol in this disease, because it yields

such a large percentage of guaiacol, and because it is easy to take and does not disturb the digestive organs. I believe that we may safely assume that if sodium salicylate, carbolic acid, creasote and guaiacol are useful, as has been claimed in the specific treatment of croupous pneumonia, then thiocol also should be beneficial to even a greater degree; but if the latter is not beneficial then it is probable that the claims made for the other remedies of this class are fallacious.

With the aid of the senior interne, Dr. T. W. Stumm, who was in charge of the ward and who recorded most of these cases, and through the courtesy of another senior interne, Dr. C. M. Echols, who made the observations on two or three other cases, we have given the remedy a trial in twenty-two consecutive cases, taking them as they came without any selection, excepting that thiocol was not given to those who were moribund on admission. In six very severe cases and in six milder cases recovery occurred, but whether influenced by the drug or not we cannot say. In two cases, Nos. 3 and 6, which were very severe, recovery occurred and we felt encouraged, but a careful study of the symptoms did not enable us to trace any definite relation to the administration of the remedy. Of course the number of cases in which we have used the remedy is too small to serve as a basis for conclusions, but the reports are strictly impartial, and when added to other similarly recorded observations, they will be of value in determining whether remedies of this class are of any service in treating croupous pneumonia.

This study is necessarily imperfect because I did not feel justified in omitting the ordinary treatment employed for this class of cases in this hospital, and therefore all of these cases received more or less strychnia, whiskey, carbonate of ammonia and anodynes, as indications suggested. They were, however, in other respects than the thiocol, treated in prac-

tically the same way as the cases recorded in a paper that I read last June, in which I showed that out of between three and four hundred patients with croupous pneumonia treated during the preceding fifteen months (who were in every other way under similar conditions), the death-rate was 36 per cent. In this series of twenty-two, the mortality has been 45·8 per cent., showing the necessity of analysing many more cases before forming a conclusion, for of the ten fatal cases, eight were alcoholics or had serious complications which would necessarily make their chances small; while on the other hand the uncomplicated cases under 45 years of age all recovered. I have grouped the cases into three classes.

First, all cases in temperate persons who were less than 45 years of age; a class in which the prognosis is usually favourable.

Second, all temperate patients over 45 years of age; a class in which, even without complicating disease, the prognosis is generally unfavourable.

Third, alcoholics and other patients in whom there were serious complicating disease; a class in which the prognosis is nearly always extremely unfavourable.

I have studied carefully in each case the physical conditions, the daily dosage and the duration of treatment, and I have endeavoured impartially to estimate the effects, if any, of the remedy, as shown by the pulse, temperature and respiration, and the physical signs. In this study I have also availed myself of the independent judgment of Dr. E. L. Kenyon, who has analysed the records of every case with great care. This analysis appears to show that the thiocol did not disturb the digestive organs in any way or cause any unfavourable symptoms in doses as high as 120 grains daily. In Class 1 all of the seven cases recovered, but in none of the cases could the changes be safely attributed to

the remedies taken. It will be noted, however, that practically all of these cases terminated by lysis, which was similar to the result reported by Robert Liegel (*Wiener Medizinische Wochenschrift*, May, 1898), who reported seventy-two cases of pneumonia treated with 120 grs. daily of sodium salicylate without a death. The records, briefly, are as follows :—

Class I.

Temperate uncomplicated cases under 45. There were seven of these cases, all of whom recovered.

Case 1.—A labourer, aged 40, had only the upper lobe of one lung involved. He did not receive any thiocol until the ninth day of the disease, on which he had 25 grs. This day his pulse ranged from 90 to 120, temperature 102° to 104·2°, and respiration 44 to 66. The next day he received 75 grs. of thiocol and for the four succeeding days 120 grs. each day. The disease terminated by lysis, but there was no evidence that it was modified in any way by the drug.

Case 2.—Labourer, aged 42. Habits irregular, but not really intemperate. Large and robust. Lower lobe of right lung only involved. Twenty-five grains of thiocol were given the fourth day of the disease, when the temperature ran 101° to 104·2°, pulse 80 to 100, respiration 28 to 32. The next (fifth) day he received 70 grains of thiocol. The temperature averaged about a degree lower, but the pulse and respiration were practically the same. The sixth day he received 100 grains, the seventh and eighth days each 120 grains, during which time the temperature, pulse and respiration gradually grew less, and they became practically normal on the ninth day. In this case vomiting occurred several times after taking whiskey and a full dose of thiocol, but it did not appear due to the latter.

Case 3.—Scholar, aged 14. Involvement of the lower half

of the right lung. This patient had been in the hospital four and a half weeks with typhoid fever when he was taken down with croupous pneumonia. On the second day of the disease the temperature was 102° to 105·2 , pulse 108 to 120, respiration 30 to 48. He was given 10 grains of thiocol. The third day the temperature was 102° to 104°, pulse 108 to 128, respiration 32 to 38, thiocol 55 grains. Fourth day, temperature 97·4° to 104·2°, pulse 100 to 128, respiration 124 to 132. Fifth and sixth day the highest temperature was 103·4°, highest pulse 136, highest respiration 132 , 85 grains of thiocol given each day. Seventh day, temperature 97·8° to 101·4°, pulse 96 to 120, respiration 28 to 32 ; thiocol discontinued at that time. The boy had had vomiting for a couple of days, and this continued for two days afterward, but it appeared to result from heroin or whiskey. The vomiting did not occur after the ninth day, and he made an uninterrupted recovery.

Case 4.—Clerk, aged 21. Both lower lobes involved when admitted to hospital on fifth day of disease. On the sixth day, temperature 102° to 103·8°, pulse 94 to 112, respiration 24 to 40 ; gave only 10 grains of thiocol. Seventh day temperature 99° to 102·2°, pulse 76 to 98, respiration 28 to 40 ; thiocol 70 grains. Eighth day, temperature, 98·4° to 101°, pulse 66 to 80, respiration 22 to 30 ; thiocol, 110 grains. Ninth to sixteenth days, temperature and other symptoms gradually subsided. During this time he took 120 grains thiocol daily, but without apparent effect.

Case 5.—Electrician, aged 36 ; temperate. Lower lobe of right lung only involved. On the eighth day of the disease temperature 99° to 103°, pulse 100 to 112, respiration 24 to 28. On the ninth day, temperature 100·4° to 102·2°, pulse 96 to 116, respiration 24 ; thiocol, 70 grains. On the tenth day 110 grains thiocol ; eleventh day, 120 grains, by which

time temperature had subsided to normal; remedy continued three days longer. Marked improvement (lysis) during the first three days the remedy was being administered, but it was at the time when the disease should naturally have terminated spontaneously, so that the effects cannot be ascribed to the medicine.

Case 6.—Labourer, aged 33. Four-fifths of left lung and a small part of right involved: thiocol. 40 grains. given on seventh day, when temperature was 102° to 103°, pulse 108 to 120. and respiration 24 to 40. The next day temperature was 2° lower, but pulse higher, respiration the same; thiocol, 75 grains. Next day (ninth) same amount of thiocol; temperature same, but pulse and respiration much lower. Temperature continued from 1° to 2° above normal. with pulse 72 to 96 and respiration 20 to 24 for the next ten days, during which the thiocol was continued in doses of 40 grains daily. A slow recovery. No apparent effect from remedy.

Case 7.—Waiter. aged 32. Upper right lobe only involved. On the fifth day of the disease thiocol, 25 grains were given, the record showing temperature 102° to 104·6°, pulse 110 to 120, respiration 26 to 40. Next (sixth) day very slight improvement; thiocol. 60 grains. Next (seventh) day, thiocol 110 grains, temperature 101·2° to 101·8°; thiocol, 120 grains given each of the next four days, during which symptoms became normal. Effects of remedy doubtful, as the disease should normally have terminated in the same way.

Class 2.

Temperate persons over 45 years of age. There were three patients in this class; the first just 45 years of age, recovered, the others died.

Case 8.—Labourer. aged just 45. Right upper and left lower lobes involved; thiocol given first on tenth day (day

of crisis). On the eleventh day, 50 grains of thiocol; twelfth, thirteeth and fourteenth days, each 120 grains; steady improvement, but not apparently modified by drug.

Case 9.—Decorator, aged 48. Lower right lobe involved. On ninth day of disease temperature 100·6° to 102°: pulse 104 to 112; respiration 32 to 36: thiocol 40 grains during the day. The following day thiocol 110 grains, and afterwards thiocol 120 grains daily until the fourteenth day. Temperature, pulse and respiration dropped gradually to nearly normal on the fifteenth day; but the patient was delirious after the eleventh day. On the sixteenth day the temperature was normal, pulse 96 to 100, respiration 28, but weak. Death, cause uncertain.

Case 10.—Salesman, aged 54. Whole right lung involved. thiocol not given until seventh day. Death came on the evening of the eighth day. No effect from the remedy.

Class 3.

Alcoholics and other cases with severe complications. There were twelve of these, eight, or 66⅔ per cent., of whom died.

Case 11.—Labourer, aged 31; alcoholic. Upper lobe of right and a small part of upper part of lower lobe involved. On seventh day temperature 102° to 105°; pulse 92 to 132; respiration 28 to 34. Gave thiocol 25 grains: eighth day, 75 grains; ninth day, 110 grains; tenth day, crisis: tenth and eleventh days, thiocol, 120 grains each day. An uninterrupted recovery without sensible modification of symptoms by medicine.

Case 12.—Machinist, aged 28; heavy drinker. Upper half of left lung involved. Thiocol given after eleventh day, 110 grs. each day until the fifteenth day. The symptoms steadily improved after the ninth day. No perceptible effect from the medicine.

Case 13.—Labourer, aged 48; alcoholic. Upper part of lower lobe of right lung and a small spot in lower lobe of left involved. On the eighth day of the disease patient received the first thiocol, 20 grains. Temperature 99° to 103°; pulse 96 to 124; respiration 24 to 32. Slightly better the next day; tenth day about the same. Thiocol, 110 grains. On eleventh day temperature 98·6° to 104°; pulse 92 to 104; respiration 36 to 40; thiocol, 120 grains. On twelfth day temperature normal; thiocol continued in the same dose for five days. Uninterrupted recovery.

Case 14.—Labourer, aged 32; alcoholic. Entire left lung involved. On fourth day temperature reached 104°: one dose, 5 grains, of thiocol was given. Fifth day temperature 101·4° to 102·4°; pulse 112 to 140; respiration 32 to 38; thiocol 50 grains. Sixth day worse; thiocol 100 grains. Seventh day, temperature 101·8° to 103·6°; pulse 140 to 160; respiration 36 to 52; thiocol 110 grains. Crisis eighth or ninth day. Thiocol same daily dose to twenty-second day. Uninterrupted recovery.

Cases 15, 16, 17, 18, 19, 20, 21, and 22 were all alcoholics, five of them less than 45 years of age and three older than this. In Case 15 the whole left lung was involved, the temperature was not high; the pulse for the two days he was taking the thiocol ranged from 108 to 104, respiration 30 to 44. Death eighth day of disease.

Case 16.—Labourer, aged 39. Alcoholic and complicated with pericarditis. Lower lobe of right lung involved. Thiocol given fourth and fifth days of disease. Died the sixth day. In both of the foregoing about 1,000 cc. of blood were drawn from the arm within twenty hours before death. Thiocol had no effect.

Case 17.—Boxmaker, aged 40; alcoholic. About two-thirds of right lung involved. Heart slightly enlarged and

muscle weak; temperature never higher than 103°, and until the day of death pulse did not exceed 106 or respiration exceed 40. Thiocol given for five days, 35 to 120 grains daily. Death ninth day of disease.

Case 18.—Labourer, aged 38; alcoholic. Inflammation involving mainly the middle third of right lung (mostly middle lobe); second to fifth days, temperature 102° to 106°; pulse 100 to 160; respiration 24 to 36; thiocol 20 to 120 grains daily, no effect. Death sixth day.

Case 19.—Jockey, aged 42: alcoholic. Lower half of right lung involved. Thiocol 25 to 120 grains daily from fifth to tenth days. Temperature, 101·8° to 105·4°: pulse 110 to 140; respiration 24 to 64. Death on tenth day. No apparent effect from medication.

Case 20.—Pedlar, aged 48; alcoholic. Small area involved in middle portion of right lung. Thiocol given seventh and eighth days in medium doses. Died ninth day, without apparent effect from medicine.

Case 21.—Labourer, aged 51; alcoholic. Lower lobe of right lung involved. Thiocol given in uncertain doses fifth and sixth days. Died sixth day. No effect from medicine.

Case 22.—Labourer, aged 57; alcoholic. Asthmatic and some hepatic trouble; heart's action feeble from the first. Thiocol given sixth and seventh days, 60 to 75 grains. Died seventh day; no effect from medicine.

This report demonstrates that thiocol may be given to pneumonia patients in large doses without disturbance of the digestive organs, and without apparent harm. In no instance could we observe that it affected the temperature, pulse, respiration, or physical signs, because in those cases where these factors indicated improvement, the natural course of the disease would have been expected to cause a similar change. We always began with moderate doses, and it took

three or four days to reach the maximum dose of 120 grains. Possibly different effects might have been noticed if the maximum dose had been attained within twenty-four hours. In future trials I would suggest that 5 grains be given as the initial dose, and that the amount be rapidly increased until 30 grains are given at each dose, providing that it causes no unpleasant symptoms. In a disease running such a rapid course as pneumonia, quick action must be obtained if the remedy is to do much good.

DEEP BREATHING.

BY RICHARD COLE NEWTON.
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THE great Napoleon preferred a man with wide nostrils, presumably because his breathing facilities are better. The questions of improving a man's breathing facilities and the accruing advantages are what I ask you to consider with me this morning.

Perhaps the best way to approach this subject is to define what is meant by the term "deep breathing." I take it to mean voluntary and full inflation of the lungs carried to the fullest extent, slowly and regularly performed, and generally accompanied by movements of the arms, chest and abdominal walls. It may also be performed by the aid of various devices and instruments, such as spirometers, inhalers, respirators, &c., some of which are efficient and convenient. Its object is to fully inflate and bring into activity the whole volume of the lungs, both the parts commonly used and those that in shallow or ordinary breathing are unused; and by exercise to increase the capacity of the lungs and improve their efficiency.

By this increase of respiratory capacity, the action of the heart and blood vessels will be strengthened and the oxygenation of the blood will be increased, with the result that all the tissues will be better nourished, metabolism will be better carried on and secretion and elimination will be more perfectly accomplished. Every bodily function will be better performed,

and in none will the improvement be more manifest than in digestion and the assimilation of food.

The quantity of air which a man breathes in ordinary expiration and inspiration is about 500 cc., while the complementary air, or the amount which can be inspired after an ordinary inspiration, is 1500 cc., and the reserve air, or the amount which can be expired after an ordinary expiration, is from 1240 to 1800 cc. (1). In fact, our breathing apparatus is said to be one fourth larger than necessary (2) for the ordinary requirements of life, and only careful and systematic training will bring the entire volume of the lungs into use.

Campbell (3) says, "Another advantage much overlooked attached to good pulmonary development, *i.e.*, the facility which large lungs afford to the circulation through them. The greater the vascular capacity of these organs, the less is the work thrown on the right heart. Now all the diseases of the left heart, but especially of the mitral orifice, tend to cast extra work on the right heart. Hence the great importance in all cardiac diseases of securing the maximum development of the lungs, and in no way can this be more effectually done than by respiratory exercises systematically carried out. In this manner we can in a short time increase the pulmonary capacity to a marked degree. The respiratory movements favour the circulation of the blood. With every inspiration blood is sucked into the right heart, while the pulmonary flow is at the same time quickened. They further aid the lymphatic circulation, pumping the lymph from the peritoneal cavity into the pleuræ, and from the latter and from the pericardium into their respective lymphatics, and hurrying on the lymph in this way. Such aids to the lymph flow are of the greatest importance in many diseases, but above all in heart disease. In various forms of dyspepsia, as in torpid liver, I have found the greatest benefit from their use, from

the pressing and in some cases dislocating the abdominal viscera."

Braum (6) has shown how numerous are the arrangements connected with the fasciæ for promoting the venous currents by means of the negative pressure resulting from the movements of the body. Farquharson (13) states in his work on Ptomaines that every arrest or detention of the respiratory functions is followed by the retention of toxic physiological *débris* in the body, and points out that the so-called pretubercular symptoms are such as might be expected from self-intoxication caused by imperfect respiration.

Jaret has shown (4) that altitude produces increased hæmoglobin and an increased number of red blood corpuscles, with decrease of nitrogen in the secretions. In animals he found that a reduction of the atmospheric pressure equivalent to 100 mm. alone, apart from any other factor of mountain climate, was sufficient to change the composition of the blood in the same way as is observed after a trip to the mountains. The total increase in the hæmoglobin was 20 per cent. The dryness, cold and other features of high altitude, tested separately, had no effect upon the composition of the blood. The amount of nitrogen retained by the organism was much more than could have been required for the new formation of the elements of the blood. This suggests that the action of altitude is not restricted to its effect upon the composition of the blood, but that it may induce a partial protoplasmic regeneration throughout the organism, conferring new vitality and resisting power on other elements beside the blood. In other words, if the inspired air is rarefied so that the lungs must expand more completely in order to take in enough air to oxygenate the blood, not only are the hæmoglobin and the number of erythrocytes increased, but the amount of nitrogen taken into the tissues is augmented and a general condition of increased metabolism induced.

The result of these laboratory experiments accords well with clinical experience.

One writer (5) has suggested that mankind would be less liable to consumption if the atmosphere which they breathed contained less rather than more oxygen. Unquestionably the principal advantage in nose breathing over mouth breathing is that the former requires more effort on the part of the lungs, and this tends, as Campbell has shown, to lighten the work of the heart, (*a*) mechanically by helping along the movement of the blood, and (*b*) by increasing its oxygenation. This latter function is augmented by the increased lung expansion in nose breathing, the greater effort required draws more air into the alveoli and distends these spaces more fully, and so exposes to the inspired air a larger area of capillaries. As proof of this statement witness the deleterious effect of mouth breathing on athletic exercises. It is well known that a runner, for instance, must breathe through his nose, although breathing through the mouth is much easier during strenuous exertion, but he will be "winded" much sooner with his mouth open than if he kept it shut.

Ingals (16) says, "by a few deep inspirations the healthy individual, who has exhausted his breath, will find that he speedily recovers it; whereas by the usual respiratory efforts he will pant for several minutes before he can obtain relief." In other words, it is deep, full and slow breathing which properly aerates the blood, not quick, panting and shallow respirations.

It is not the purpose of this paper to take up the physiology nor the therapeutic value of bodily exercise in general, although it is impossible to discuss deep breathing without some reference to general muscular exercise. What the writer fondly hopes is to provoke some general discussion on this important subject, and himself to learn from the opinions of others more

about a question that is not yet well understood and is too little spoken of by medical teachers and writers generally. After a conversation with a physical trainer and a so-called physical culturist of national repute, the writer could not avoid the conviction that the profession has much to learn in reference to these matters, and not only that, but the corollary was equally obvious that if we are to be prepared to meet and answer the claims and pretensions of physical culturists and osteopaths, we must undertake all manner of investigation into every aspect of physical development, massage, pulmonary gymnastics and general and special exercises and movements. Hartwell says (9), "It seems a misfortune or worse that the profession is as yet unprepared or unwilling to speak with authority on the uses and abuses of exercise." Perhaps nothing is more striking than the more or less contemptuous way in which physical trainers, &c., speak of the medical profession; and that this contempt is partially, at least, deserved, certain remarks of Professor Hollis, of Harvard, in a paper on College Athletics seem to prove. Speaking of the employment of a professional trainer the Professor says: "The professional seldom possesses the ideals which should prevail in a college atmosphere. His introduction probably springs from the difficulty of getting practical advice from the doctors. Their experience has usually been with sick men. When confronted with the problem of taking care of well men they seem to fail."

So far as my experience has gone, the strictures of Professor Hollis are little if any too severe; and it is because I believe that the time has now come when we must arise to the situation and must be able to inform our patients whether they should exercise or not, and if so, should be able to instruct them fully as to the best and safest form of exercise, that I have ventured to take up so much time with a paper of this sort. It is impossible for me to try and cover the whole

ground, and what follows is meant to be rather suggestive than conclusive.

I believe that you will all admit that deep breathing is for a person in health safe and desirable, but it seems to me that the fact that few people breathe properly is too little known to either the profession or the laity. Our own Otis (9) says that after examining 12 to 1,500 chests he has found very few individuals who breathe fully and properly; Minor says, not one in twenty (10): Ingals (11) observes, "It is a matter of surprise to those who have given the subject thought to find how superficially many people breathe, and how little they know of this most important physiologic process." And one of the physical culturists spoken of above says that after measuring the lung capacity in 20,000 persons, he finds that not 1 per cent. of them has strong lungs and breathes fully. He also asserts that consumption is the athletes' disease, and that the majority of athletes die of it, and claims to have a list of two hundred athletes, prize fighters, &c., who have succumbed to the disease. He further asserts that this loss of life is entirely needless and is due to a failure to develop the respiratory apparatus commensurate with the voluntary muscles. Had the balance between these functions been maintained, he argues that the health would not have suffered, but on the contrary would have been greatly benefited by the muscular training. After a prolonged conversation with the gentleman I am convinced not only of his honesty but of his intelligence. In corroboration of his position I may quote Stecker, who says (30). an inherited predisposition to phthisis may be suspected when the ability for respiration is reduced out of proportion to the general muscular power of the individual.

Practically, the subject naturally divides itself into two divisions, the curative and the prophylactic uses of deep breathing. I will not say a great deal under the first head,

hoping that men who have had far more experience than I will give us their views freely. In looking over the recent journals one finds many references to deep breathing, but in the text-books which I consulted very little was said. I only noted one reference in a text-book, and that was in Professor Gilman Thompson's "Practical Medicine" (p. 275). The general opinion of the profession seems to be that full inflation of the lungs and expansion of the chest is a good thing for consumptives, except when fever or hæmorrhage is present; although there are writers who advocate it all through the treatment, without reference to fever, and say that it does no harm. A number assert that the chief advantage which comes from inhalations of medicated vapours is due to the deep breathing which they cause.

Some advise inhalations very moderately and carefully made, while others are less particular as to the methods to be observed. Certainly it would be an excellent thing if this Society could take an authoritative position on this important question and advise the profession whether or not deep breathing should be practised by consumptives generally, and if so, could lay down positive rules as to the method of its application, and the limitations to be observed. The rule that any patient with a fever should keep quiet is well enough known to the profession, and even to the laity, but as I have said above, very little seems to be generally known in regard to the uses and abuses of deep breathing.

The Nordrach system of treatment for consumption, as opposed to the Dettweiler system, advocates much exercise in addition to fresh air and superalimentation; whereas the latter system enjoins rest in the open air and superalimentation. Undoubtedly deep breathing may do harm if injudiciously employed. If it were not capable of injurious application it would stand unique amongst all medicaments and therapeutic devices known to our art. In addition to its

use in consumption various references were noted advocating deep breathing in other diseased conditions, as, *e.g.*, Jacobi (15), Musser (16), Vergely (28), Talma of Utrecht (14). strongly advocate its regular employment in asthma, pointing out that a marked characteristic of asthmatics is their shallow breathing. Daland (15) speaks of it as an adjuvant in the successful treatment of heart disease. Anders (17) says that the abnormal respiratory conditions in sufferers from obesity have not been sufficiently studied. Their pathogenesis is not clear, but the mechanical embarrassment from the deposition of fat throughout the body will largely account for them. He states that he has found the average chest expansion in obese subjects to be less than 2·5 inches, and says it is evident that such interference with lung expansion must excite dyspnœa after muscular exercise or over-distension of the stomach, and even during recumbency. Unquestionably here is another vicious physiological circle. Indolent and shallow breathing causes suboxidation with resulting obesity and obesity, is a prominent cause of dyspnœa on exertion. This latter condition fosters inactivity both mental and bodily, and so the whole economy suffers from malassimilation, delayed metabolism, &c. Certain subjects suffering from some inflammatory or obstructive conditions of the nose, throat or lungs, have been observed to become obese, as sufficient oxygen cannot be inspired to properly aerate the blood and burn up the waste, and consequently fat accumulates in the tissues (18).

Diabetes (21), another disease of suboxidation, ought to be largely benefited by deep breathing. Although I found a number of references to the benefit of muscular exercise in this disease, I found no special reference to the effect of deep breathing upon it. It is a noteworthy fact in this connection that 25 per cent. of diabetics die of phthisis pulmonalis (27). In cholelithiasis Dr. Robert Gasser (19) recommends regular deep-breathing exercises. He denies the infective

origin of gall-stones and deprecates operation, insisting that a hygienic method of life will prevent their formation.

Douty (22) proves that syphilis is amenable to open-air treatment and exercise, as well as tuberculosis, and this accords with the opinion of Professor George H. Fox, of New York, who said in the writer's hearing that the proper way to handle a syphilitic was to train him, as if for a prize fight.

Dr. Ingersoll reminds us that spinal curvature is also a diseased condition which can be prevented if treated in its first stage by gymnastic and deep-breathing exercises, but upon which medicine will have no effect.

As to the prophylactic aspect of pulmonary gymnastics, every authority that I have been able to consult, who takes the pains to consider the prophylaxis of phthisis, recommends it. Knopf urges that every child should be taught deep breathing as soon as he is strong enough and sufficiently intelligent to learn it. It is needless to add that I entirely agree with him. Deep breathing seems to be pretty thoroughly taught now as an essential part of many, if not all, good gymnastic courses, but so far as it is taught in schools it seems to amount to little, and to have little if any permanent effect upon the scholars.

In a recent editorial in the *Lancet* (20) the ground is taken that no system of education is complete that does not educate the body as well and as thoroughly as it does the mind. Those educators who have given the subject sufficient thought, are largely willing to acknowledge the justice of this position, but no adequate means for carrying out these suggestions have so far been adopted, at least so far as I can learn, in any part of the United States.

Some steps have, it is true, been taken in this direction, but not much good will be accomplished until thoroughly trained medical men shall have charge, not only of the hygiene

of the schools, but of the physical education of every scholar, and regular examinations of physique, vital capacity, lung development, &c., shall be held, and as is now done in some of the high and normal schools, the pupil must pass in these important branches before he or she shall be promoted, just as he or she must now pass in their studies. In other words, in proper physiological education the bodily functions shall be educated as being equally or more important to the child's future well-being than the mental.

You will tell me that athletic sports are increasing and doing much good. So they are. But these sports fail to benefit those most needing physical education, and they are sometimes hurtful, and cannot be relied upon to develop all the bodily functions symmetrically. They are not begun early enough to benefit the little children, and would not be safe perhaps for them. They scarcely affect the large masses of girls and boys that we especially wish to build up and fortify against consumption and other illnesses, and fit for their work in life. Let us strike for a thorough, rational and properly carried out physical education. Hitchcock (29) has said, "There is no doubt that if as much care were bestowed on our young in seeing that this particular part [the thorax] was developed with that care that the brain receives, tuberculosis would almost disappear."

Scheidt (23) says that "the foundations for a healthful and useful life are laid between the seventh and fifteenth years, and never afterwards." McLean says (24), after having described a system of pulmonary gymnastics, "If the phthisical patient would live and be healthy he *must work for it*, in the way I have indicated, or by some similar method, or he will miserably perish, notwithstanding he may swallow all the drugs in the dispensatory and be injected with all the serums and specifics, so-called, which are now obtainable."

Dr. Van Weissmayer says (26), "In the education of the people lies the great hope of prophylaxis." M. Georges Demery says (25), "The essential of physical education is voluntary motion."

How, then, shall we sum up this well-meant, albeit somewhat disjointed, paper? I offer the following conclusions:—

(1) Deep breathing is essential to good health, and is in many cases a valuable therapeutic measure.

(2) Its importance is not at all generally appreciated.

(3) It should be a part of every child's education.

(4) It is especially indicated for backward and sickly children.

(5) The profession owes it to itself to study more deeply this vital question and to be able to instruct the laity fully upon all its bearings.

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BRONCHIECTASIS IN THE TUBERCULOUS—AN UNUSUAL CASE REPORTED.

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Dr. Friedrich A. Hoffmann, of Leipzic, in his article upon the Bronchi* in "Nothnagel's Encyclopædia of Practical Medicine" writes:—"as a fundamental principle we may accept the axiom that tuberculosis may occur as a complication of bronchiectasis, but not the reverse, which is practically correct." He also says,† "in a certain number of cases tuberculosis complicates the clinical picture of the bronchiectasis. While the one is not excluded by the presence of the other, they do not co-exist very frequently. Smaller bronchiectacic areas which have no special clinical significance are not infrequent in tuberculosis. There is a tendency to formation of larger bronchiectacic areas in tuberculosis only in cases which tend to recover by the formation of connective tissue, and these are always from circumscribed processes occurring in the apexes of the lungs. Emphysema of the lungs of a higher degree is often found in the final stage of bronchiectasis, which begins as an emphysema of the borders of the lungs representing a kind of compensation to aid in the filling out of the pulmonary space in the thorax: its occurrence is favoured by coughing."‡

* Page 202. W. B. Saunders and Co., 1903. † Page 184.
‡ Page 184. W. B. Saunders and Co., 1903.

These statements accord with my own clinical experience. When we find clearly marked bronchiectasis in a case of pulmonary tuberculosis, it is nearly always in an old chronic case of fibroid phthisis, in which the fibrosis is so extensive as to cause dyspnœa upon even moderate exertion. I need not dwell on the diagnosis between an enlarged bronchus and a cavity. You Fellows of the Climatological are too well acquainted with the classical picture, though even the highest authorities are sometimes mistaken in their diagnosis, but in most instances it is not difficult for the trained observer to distinguish between them. The case that I wish to bring before you has quite unusual features, and so far I have not been able to find a record of a similar one. It has rather a long history, of which I will present the salient points.

Mrs. O., residing in Western New York State, aged 48, had enjoyed fairly good health except for a tendency to catch cold in the spring and get run down. In May, 1900, she caught a more than usually bad cold and became much depressed by it. The diagnosis made by the family doctor was bronchitis, but there was no examination of the sputum. She rallied from this after a two month's trip in Europe, and returned with only slight cough and expectoration. In January, 1902, she became worse again, went to southern California without benefit, and then to the Adirondacks. While there her cough and expectoration almost disappeared, but coincident with this change she developed a fever and returned to her home at the end of June, 1902, feeling worse. She came to Colorado Springs the following 12th of July.

I first examined her on July 15, 1902. Her height was 5 ft. 7 in., weight 119½ lbs., average normal weight 130 lbs. Temperature a.m., normal; p.m., 101°; pulse 100, weak; respiration 22; some gastro-intestinal indigestion, sleeping poorly, very nervous, cough infrequent, moderate, but spasmodic.

The expectoration was scanty, watery, with a little mucus and pus, containing many staphylococci and streptococci, but no tubercle bacilli. The chest expansion was barely 2 inches. There was a small area of consolidation in the right middle lobe around the root of the lung, and over this area the sounds were conducted and without râles. There were a few scattered dry râles and semi-tubular breathing at the right apex above the second rib. The blood examination showed 3,672,000 red cells and 13,200 white cells, hæmoglobin 68 per cent., no sign of malaria or typhoid. The temperature soon began to be above normal throughout the twenty-four hours, running up to 102° F. in the afternoon and evening, dropping to 100° F. in the morning. There was a slight chilliness and an inclination to sweat, with increasing loss of flesh and strength. Cough gradually became more frequent and irritable, but there was no increase or change in the expectoration. Becoming rapidly worse, she was put to bed on August 13.

A second blood examination made four weeks after the first, showed no leucocytes, no malaria, no Widal's reaction; an increase of red cells to 4,625,000 and hæmoglobin to 75 per cent. The blood count and percentage of hæmoglobin still remained, however, much below what is normal, after a month's residence at 6,000 ft. elevation. Her temperature at this time ranged from the lowest point, which usually occurred at midnight, from 99$\frac{3}{5}$° to 103°, the highest point, at 4 p.m., never dropping below normal in the whole twenty-four hours. From August 23 to September 2 it showed a marked rise, the highest point being reached on August 29, when at 6 p.m. it registered 104$\frac{2}{5}$°. There were frequent examinations of the sputum made. On August 24 no tubercle bacilli were present, but on the following day tubercle bacilli in the number of 50 to 100 to each field were discovered, there being two or three groups of 10 or 12 bacilli to the field;

the other tubercle bacilli lay scattered pretty regularly, some discrete, some forming V's, and some end to end. They stained well and were beaded. On August 26 I commenced giving a saturated solution of iodide of potash, beginning with 5 drops three times a day, increasing one drop a day. On September 1, at 4 p.m., her temperature was 104°. She then had a violent eruption of fœtid, purulent sputum, scarcely ceasing coughing for several hours. The odour was not that of gangrene, nor did the microscope show the characteristics of it or of a broken down gumma or of a pneumonic abscess.

After this occurrence the temperature began to drop down, and from this time on the expectoration continued much freer than before the eruption. It always showed some tubercle bacilli. The cough was much less harassing, and as has been stated, the temperature dropped down so as to usually range between 99° and 101°, and it continued to fall so that between about the last half of November and first half of December it was nearly normal. During this time the patient's general condition was much improved, particularly as regards her strength and digestion; she spent most of the day lying out of doors, and the iodide of potash which had been increased up to 40 drops a day, was changed for Nourry's iodine wine, 3 drachms 3 times a day. Whenever the temperature rose, as it did several times afterwards, and was always accompanied by a more or less complete cessation of cough and expectoration, the iodide of potash solution was again resorted to, 40 grains in twenty-four hours, the result invariably being that the expectoration and cough returned and the temperature dropped. On December 10 the temperature again began to rise, reaching $104\frac{4}{10}°$ on the morning of the 14th, when there was an especially violent eruption of purulent expectoration, 16 ozs. in twenty-four hours. After the first eruption there was no odour to the sputum. The

microscope revealed many tubercle bacilli in compact groups of 10 to 50 in each. These groups had the appearance of having been compressed and moulded into shape, looking as if they must have been confined in a surrounding envelope, though there was none. Other bacilli and cocci were absent, although many had been present up to the time of the first eruption, since when they had gradually disappeared. *Macroscopical appearance:* Sputum divides itself into three layers, the lower, comprising about half the bulk, is rather clear like saliva, with but few flakes. The second or middle layer consists of masses of tough yellow muco-pus in separate masses, elongated, finger-like; the top layer, consisting of about one-eighth of the bulk, is of white froth. On January 8 specimen submitted showed at the bottom a fourth layer, of muco-pus. Immediately after this eruption the temperature dropped down until the 18th, when the sputum again became scanty and the temperature rose. There was then another similar eruption followed by a like drop in the temperature. Two weeks later the expectoration again became scanty, the high fever returned, and this was quickly followed by an eruption and then a fall of temperature. Since this time the expectoration has remained free and the temperature moderate. The number of bacilli has steadily decreased so that at present they average only 5 to a field. The character of the sputum is now more mucoid than purulent and has the blenorrhœic character of a bronchiectasis. The amount averages 5 ozs. in twenty-four hours, the proportion of the thick material steadily diminishing. The patient is gaining in weight and strength, and now drives out and walks daily.

With respect to the physical signs, previous to the first eruption, atâlectasis developed in the right lower lobe. After the eruption there was a partial clearing of the consolidation in the middle lobe and more air began to enter into the lower.

At the time of each eruption, large, coarse, moist râles of varying character were heard over this area. There were also transitory bronchial râles on the left side. During the intervals all râles generally disappeared, except that the tuberculous râles have been a little more noticeable at the right apex than at first. At no time was there any good evidence of a cavity in any part of the chest. On March 3 an X-ray picture was taken of the back of the thorax and on the 13th a picture from the front was taken. You will see by the two skiagraphs that there is upon the right side what appears to be a dilated bronchus. It was over this region that the original dulness was noticed. This appearance shows in both pictures taken front and back, and seemed very evident on direct inspection with the fluoroscope. In the front view the wrong side of the plate was accidentally applied, so that the enlarged bronchus shows on the left instead of the right of the picture.

For the past three weeks the patient has been daily inhaling the vapour of compound tincture of benzoin with equal parts of glycerine and alcohol, from a large globe inhaler, the vapourisation being effected by air compressed by water pressure, so that there is produced a large volume of vapour, without fatigue to the patient, who uses it by deep inhalations for fifteen minutes, with frequent intervals of rest. The expectoration now shows a more rapid diminution of the thicker material and of the pus and bacilli, and the periods between the coughing and raising have become prolonged, especially since the inhaling has been practised.

In order to arrive at a diagnosis it is well to first reconsider the main points in the history of the case. We have a woman subject to frequent attacks of bronchitis. A period when there was a good deal of spasmodic coughing without expectoration and a general depression of health, but no fever. Then

a continued fever, and not intermittent like hectic, cough diminished, and still no expectoration ; emaciation ; general depression ; gastro-intestinal indigestion, with no relief of the fever from treatment. Next a rapid increase in the temperature, with bacilli first appearing. Then came relief, with the administration of iodide of potash, which apparently effected its purpose by causing an absorption of lymph and a free escape of purulent tuberculous matter which had evidently been compressed in some sac or tube. As a result ensued a subsidence of the high continuous fever and in its place an ordinary mild hectic, with free expectoration and moderate cough, interrupted, however, several times by a cessation of the cough and expectoration, followed by a return of the high continuous fever, and no relief until the iodide of potash was again freely given. Finally a period of six weeks of almost steady improvement, with free but slightly diminishing cough and expectoration.

The local pulmonary signs indicated an old inactive tuberculous process at the right apex and solidification around the root of the right lung, with slight incomplete atelectasis of the right lower lobe. Up to the time of the first eruption the presumed tuberculous area at the right apex remained quiescent, but the consolidated area at the root and the atelectasis increased. Following the eruption these two conditions were both diminished, but at the extreme right apex there appeared some return of activity.

Neither Dr. W. H. Swan, who has seen the case several times, nor I, could detect any evidence of a cavity, and the character of the expectoration negatives the idea of its presence, as also does the general behaviour and the clinical picture of the patient. The local signs at one time suggested a broken down gumma, but the expectoration and other symptoms did not. The patient bore none of the stigmata

of syphilis and the history was totally opposed to this diagnosis. Moreover, the iodide of potash could not be administered, except in moderate doses, without producing iodism, or only for a short time. There was no history of an acute pneumonia which might have resulted in an abscess. Gangrene of the lung, of which I have seen several cases, and as it happens, two within the year, has various points of difference, especially in the odour and constituents of the sputum, though in the violence of the cough and the eruption there is a close resemblance to this case.

My theory of the case is that there had been in some indeterminate time in the patient's history, an acute tuberculous infiltration at the right apex resulting in an arrest by fibrosis: and also tuberculous infiltration of the bronchial glands, probably preceding the apical disease. That, commencing during the ill-health which immediately preceded the patient's coming to Colorado, the tuberculous glands began to suppurate and press on the right bronchus above what may have been a previous dilatation, thus causing a partial stenosis of the right bronchus. As regards the cause of the presumed dilatation, it might have commenced during the recurrent attacks of bronchitis, or it may have ensued in consequence of the pressure on the bronchial glands. As the glandular swelling increased there ensued complete occlusion of the tube: then ulceration from the glandular tumour into the enlarged bronchus so that its contents poured in and filled up the dilatation tight: thus the contents were compressed. Probably this occurred at the time that the temperature ran up to over 104°, and doubtless, by affording a larger area for absorption of septic material, was the cause of its doing so. I then commenced the administration of the iodide with the result of producing sufficient absorption of the glandular tumour to relieve the stenosis, so that some of the contents of the enlarged

bronchus escaped after violent coughing. However, it would seem as if until comparatively recently the stenosis was not entirely removed, but now it evidently is, because the sputum is very easily raised, particularly by the patient when lying down, and the character of the sputum and cough now resemble that of an ordinary case of bronchiectasis. At no time have there been marked emphysema or dyspnœa, which facts are opposed to the theory of a bronchiectasis of long standing.

Referring once more to the axiom stated by Hoffmann and quoted at the beginning of this article, viz., that as a fundamental principle it may be said that tuberculosis may occur as a complication of bronchiectasis, but that practically bronchiectasis of large areas never arises as a complication of tuberculosis. Nevertheless, it is admitted by him that small bronchiectacic areas without special clinical importance are not infrequent, also that large areas sometimes occur in the tuberculous in cases in which there have been circumscribed processes in the apices and a tendency to recovery by subsequent fibrosis, and only under such circumstances. This latter category is apparently the one into which this case falls in so far as there was undoubtedly a previous tuberculosis at the right apex and in the bronchial glands, but that the bronchiectasis was caused, or at least brought into prominence, by the pressure of the swollen bronchial glands rather than by the fibroid changes of the lung tissue.

NEGLECTED PROPHYLACTIC MEASURES AGAINST DISEASES OF THE RESPIRATORY TRACT.

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It is not my purpose to speak of all the neglected prophylactic measures against diseases of the respiratory tract. I desire merely to emphasise several of the directions in which our efforts of prophylaxis fall lamentably short of our present-day knowledge of the subject.

The first of the points to which I wish to invite your attention is the detrimental influence of dust of whatever kind in causing irritation of the mucous membrane of the respiratory tract, thus paving the way for subsequent infection. It is an accepted fact that different kinds of dust operate in this manner, and yet there is no intelligent effort made to abate the evil wherever possible. In many industrial pursuits it is well known that the dust-laden atmosphere of the establishment is the primary cause of the prevalence of diseases of the respiratory tract, especially tuberculosis, amongst the operators. Modern improvements in machinery have done a great deal towards ameliorating the evil, but these alone are insufficient to overcome the detrimental influence of the dust.

In discussing a subject such as this I am well aware that I am going outside the domain of pure medicine into that of social hygiene; but I earnestly believe that the medical

profession must first be aroused to a sense of the importance of the subject before it will be possible to reach the ears of the industrial world.

Our efforts at ameliorating the evils of this nature, besides insisting upon the introduction of machinery designed to limit the production and to assist in the abstraction of the dust from the establishment, should be directed towards regulating the hours of employment in such establishments. Röpke (*Centralblatt f. allgem. Gesundheitspflege*, 1900, *Sonder abdruck*) in a comparative study of the prevalence of diseases of the respiratory tract in the metal grinders of Solingen, Germany, and those of Sheffield, England, shows that in spite of the fact that the establishments at Sheffield are far less satisfactory and the arrangements for the removal of dust are poorer than at Solingen, the workmen at Sheffield present better health statistics. These results he attributes to the fact that at Sheffield the workmen are more generally abstainers, engage in athletic sports, live in better houses, and assume a better position at their work. The influence of prolonged sojourn in the open air, associated with athletic sports is, no doubt, one of the principal factors in bringing about the better conditions of health among the Sheffield grinders. Lack of detailed study in this particular prevents us from making more than general statements upon this point.

Many other industrial pursuits are attended with the production of dust, and observation has shown that the prevalence of diseases of the respiratory tract is far more pronounced amongst those following such occupations than in those who engage in pursuits unattended by dust formation. Our knowledge of the great hygienic value of pure air as a prophylactic agent against disease suggests one of the most efficient modes of combating the detrimental influences of the dust in such occupations. If we can secure for workmen

of this class a shorter working day, and at the same time encourage them in devoting the greater part of their leisure to outdoor exercise, we place them in a better position to overcome the injurious effects of the dust inhaled during their working hours.

Another form of dust which has become a menace to our lives in recent years is that generated in the streets in the larger cities. Since the advent of electric cars and smooth pavements the lives of the inhabitants of cities have been made miserable by the volumes of dust which are constantly formed on the streets. There is no doubt that this modern condition of city streets influences the apparently greater prevalence of diseases of the respiratory tract in recent years. It not only favours the more general dissemination of the specific micro-organisms, but it also serves to lower the vitality of the mucous membranes of the respiratory tract, and thus facilitates the invasion of these tissues by the bacteria when inhaled subsequently.

The remedies that may be suggested to abate this evil are not very satisfactory, though they may be made effectual to a certain degree. The efforts of the street cleaning departments are evidently too spasmodic to accomplish all that could be accomplished. More efficient cleaning of the streets at a time when they are practically unoccupied—the early morning hours—and the systematic sprinkling or flushing of the pavements, will assist in minimising the evil. Let us hope that in addition to a more efficient street cleaning we may, in the not far distant future, see all lines of transportation placed underneath or above the streets, and the employment of draught horses superseded by other non-dust-producing modes of propulsion.

The second point to which I wish to direct your attention is the great deficiency in the ventilation of so many of our

public schools. It is a well-known fact that the constant breathing of air markedly vitiated by the excretions from the lungs of other persons exerts a detrimental influence upon the vital powers of the system. Nevertheless we find many of our public school buildings overcrowded and in consequence the way is opened for the more general distribution of the micro-organisms of disease when brought into such an overcrowded space.

The greater prevalence of such diseases as diphtheria, measles, and scarlatina during the autumn months can be definitely traced to the very intimate association of children in overcrowded and poorly-ventilated school rooms, and to the diminished resistance of their bodies to infection in consequence of the injurious effects of such overcrowding.

We have a general knowledge of the overcrowded condition of the public schools in different places, but, so far as I know, no systematic effort has been made to gather detailed information regarding the ventilation of the public schools, except that just published by the State Board of Health of Ohio (1901) for all the schools in cities and towns of that State. This report is most interesting and important and should be duplicated elsewhere. The tables given in this report show the number of square feet of floor space and the air space for each pupil in a room, as well as the ratio of window area to floor space. The investigation shows that 18 per cent. of the schools contain one or more rooms that fall below the minimum standard of 15 square feet of floor space and a still greater number (28 per cent.) fall below the minimum standard of 200 cubic feet of air space, while 75 per cent. of the school buildings have rooms that are deficient in light, in that they fall below the standard of a window area of 20 per cent. of that of the floor space.

Conditions such as these are no doubt very general through-

out the country, since there is no probability that the conditions are worse in Ohio than elsewhere. With conditions such as these prevailing in our public schools it is no wonder that diseases of the respiratory tract are so readily disseminated amongst school children. Moreover, deficient ventilation and lighting are potent agencies in undermining the vitality of the bodies of growing children. It is of the greatest importance that the children of our public schools be protected from all detrimental agencies possible.

Among the prophylactic measures against diseases of the respiratory tract, the two measures which appear to require our most urgent attention are the prevention of the formation of dust and the regulation of deficiency in ventilation and lighting of our public schools. The neglect of enforcement of sanitary laws in these two particulars is no doubt the cause for untold suffering. The regulation of sanitary questions of the magnitude of the ones under discussion must necessarily fall upon the State. The educated physician can do much, however, in creating public sentiment and directing it into the proper channels of action.

THE CYRTOMETER: A NEGLECTED INSTRUMENT OF PULMONARY DIAGNOSIS AND PROGNOSIS.

BY CHARLES L. MINOR, M.D.
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With the advances clinical medicine is making in these days and with the multiplication of instruments of precision, the professional man finds himself so occupied testing the merits of new apparatus and learning to apply them to the study of his cases, that he is apt to forget older, but not less useful, instruments. Thus it happens that the cyrtometer, which is capable of giving us great assistance in pulmonary physical diagnosis, has, to judge from a careful study of modern text-books and periodical literature, been sadly neglected, save in orthopædic work, and is now only found in use in a few of the clinics and by a very few practitioners, while the profession as a whole and even most of our teachers know nothing of its practical use, beyond a few tracings reproduced perfunctorily in the text-books of physical diagnosis. Being convinced from five years' systematic use of the cyrtometer that the profession cannot afford to neglect so useful an instrument, I wish to-day to draw the attention of the members of this Society—which is especially engaged in the study of thoracic diseases and who are therefore naturally interested in anything that will add to the accuracy of their pulmonary diagnostic work—to its value, more by a demon-

stration of the results it can give than by any exhaustive paper, as I plan later to report more fully in that direction. That a knowledge of the thoracic perimeter in many chronic and some acute pulmonary diseases is of value, I suppose few will dispute; but those who have not been accustomed to use this instrument on all their cases will be surprised to find what instructive results it can give. Both as a diagnostic means and as a method of following the course of a case and drawing a prognosis, it is of great value and will enable one to form a much clearer idea of the great utility of certain therapeutic measures, notably, for instance, of properly applied pulmonary gymnastics. In the early diagnosis of pulmonary tuberculosis the lessening of the perimeter on the affected side gives us as valuable aid as does the limitation of motion of the base, as shown by percussion or more graphically by the X-ray. A progressive shrinking of the perimeter during the course of a case of pulmonary tuberculosis is, with certain exceptions, a prognostic sign of bad omen, though in certain cases of fibroid phthisis, such a shrinkage is compatible with a condition of fair health and a relatively stationary trouble. The effects of old pleurisy and, as I have said, the good effects of pulmonary gymnastics in re-expanding the chest thereafter are beautifully shown, while in pleurisy with effusion and empyema we find it of undoubted value. In watching the progress of a case of pulmonary tuberculosis, used once a month it gives the greatest assistance, showing, as I shall shortly demonstrate, in nearly all cases where improvement is going on, a marked re-expansion of the contracted thorax, and in those which are doing badly very generally an evident shrinkage. In such cases it will generally be found that if the trouble is of an incipient nature the bad side will be the first to show re-expansion, the good side gaining little or nothing, since it has not had time to participate in the thoracic

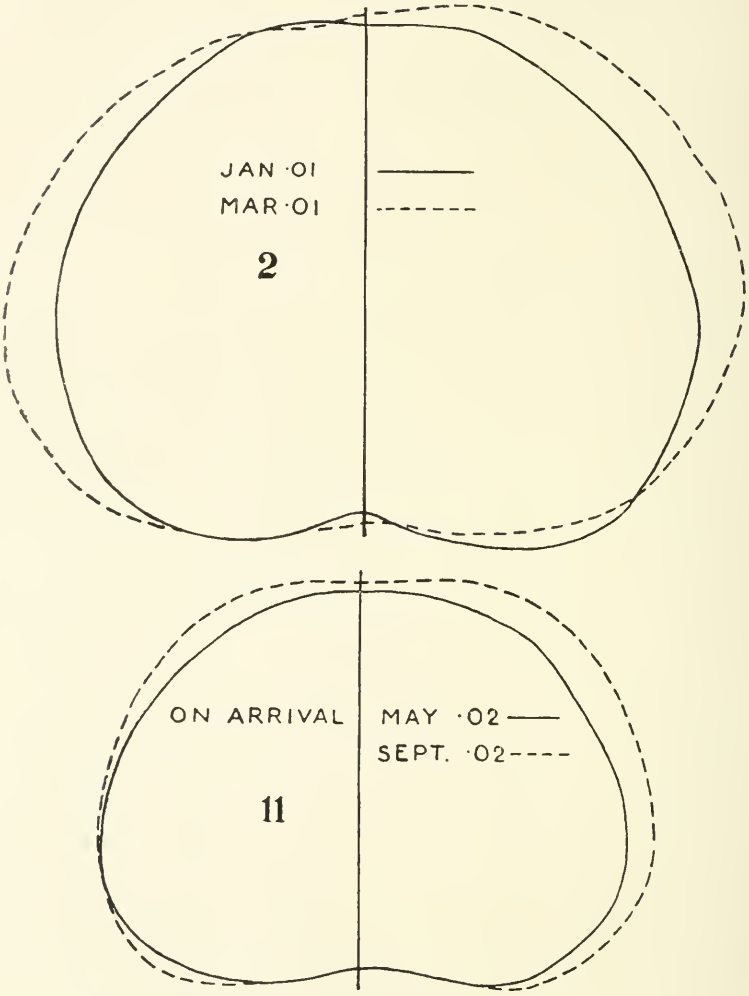
shrinkage. In severe cases, on the contrary, it is the least affected side which first shows gains, which are evidently compensatory in nature, and later on as the improvement extends, enlargements of the worst side will begin. Turning to the practical application of the instrument, I will first devote a few moments to the necessary apparatus. As far as I know a satisfactory cyrtometer cannot be purchased at any of our instrument dealers, but fortunately one can be very easily procured in any town. Sheet-lead of the proper thickness cannot be generally had, but a plumber can take a 2-foot length of large lead pipe with a wall thickness of $\frac{2}{16}$ to $\frac{5}{32}$ of an inch, split it longitudinally, flatten it out, and cut it into strips $\frac{5}{8}$ of an inch wide, and, of course, two feet long. A strip of less than $\frac{2}{16}$ thick and $\frac{5}{8}$ of an inch wide will not hold a shape given it safely, a thicker one is too stiff and is apt to hurt the patient when moulded to his side. Since the handling of the bare lead soils the hands and the patient's thorax, it is best to have a shoemaker cover it with soft thin calf skin sewed along one edge and across one end, the other end being left open to permit motion of the lead when bent. An essential accessory is a pair of callipers with which to take the antero-posterior diameter of the chest which, to accommodate the chests of the largest men should open to fifteen inches. While many excellent callipers can be bought of instrument dealers, they are mostly rather expensive, but an excellent wooden one can be obtained from the companies supplying the apparatus to the gymnasiums of our colleges for about $1.50. With these two instruments and an aniline skin pencil one is equipped for accurate cyrtometry, but, as with the use of every other instrument of precision, much of the satisfaction of our results depends upon the neatness and accuracy of the observer's work. Our aim being to get a graphic record of the horizontal plane of the thorax, vertical

to its long axis. a study of the conditions will demonstrate that the most satisfactory plane will be one which intersects the eighth dorsal spine posteriorly and the sternum at the level of the fourth chondro-sternal articulation anteriorly. Any spine higher than the eighth will cause the cyrtometer to cross the scapula and yield an unsatisfactory result. and while a lower spine can be used so long as it is not so low as to cause the instrument to leave the surface of the thorax as it passes forward. experience has taught me that save for special cases the results are not so good. Any rib higher than the fourth brings the cyrtometer over the axillary folds: as I have said, a lower rib can be chosen, if desired. save in women. or very fat men. where the breast interferes with our results. Indeed, I would say at this point. that in stout women. or in very stout people generally. if the flesh be flabby, as it so often is, the results are by no means so satisfactory as in others. The patient being seated, stripped to the waist, I mark with a skin pencil a horizontal line across the sternum at the level of the fourth cartilage. and in the same region a vertical line along the centre of the sternum. Similarly I mark horizontal and vertical lines over the eighth spine, taking great care to avoid shoving of the skin. The patient sitting erect but not strutting or expanding his chest by undue inhalation. I take the depths between these two points with my callipers and transfer it to a sheet of paper: now sitting, facing the patient's left shoulder. I pass the lead tape between the right arm and the body, hold its posterior end carefully on the eighth spine, taking care that in the subsequent manipulations it does not slip from this point, and mould it from behind forward to the configuration of the thorax. To get closer approximation at the sternum I roll in the anterior end of the tape. I now see that the fit is snug throughout the course and that the posterior end has not

changed its position, and that the skin of the sternum is not shoved laterally, and mark with my finger nail the point upon the tape where it crosses the central line in front, and then carefully remove it not horizontally, but by raising the two ends until it can slip off the chest without being bent. Transferring the lead to the paper, I place the posterior end on the mark corresponding to the eighth spine, and put the anterior on that for the fourth rib, when, with a pencil, the tracing is transferred. Without changing my position relative to the patient, the same process is carried out on the left side and placed upon the paper as before.

In this way we get an accurate reproduction of the horizontal plane of the thorax about the centre of its axis. Repeated tests have satisfied me that with the use of the callipers and with care in our work, we can get an accurate tracing every time, the chief possible element of error coming from variation in the degree of erectness of the patient, which with care can be controlled. The same tracing can be taken several times and each tracing will coincide in all material points with its predecessors, or taken at various times during the year the general configuration is always the same with the exception of such changes as are the results of the natural expansion of the chests under the effects of altitude and gymnastics. The depth as well as the breadth of the thorax will be found to increase in favourable cases, though it is chiefly in the breadth that the increase is made. As I have said, I intend, at a later date, to report more fully on the significance of these tracings and the behaviour of the thorax in pulmonary tuberculosis. For the present I will be satisfied if I succeed in calling the attention of such of my colleagues as heretofore have neglected this instrument to its value, and will now occupy the rest of my time in demonstrating on the subject the application of the instrument and in showing a

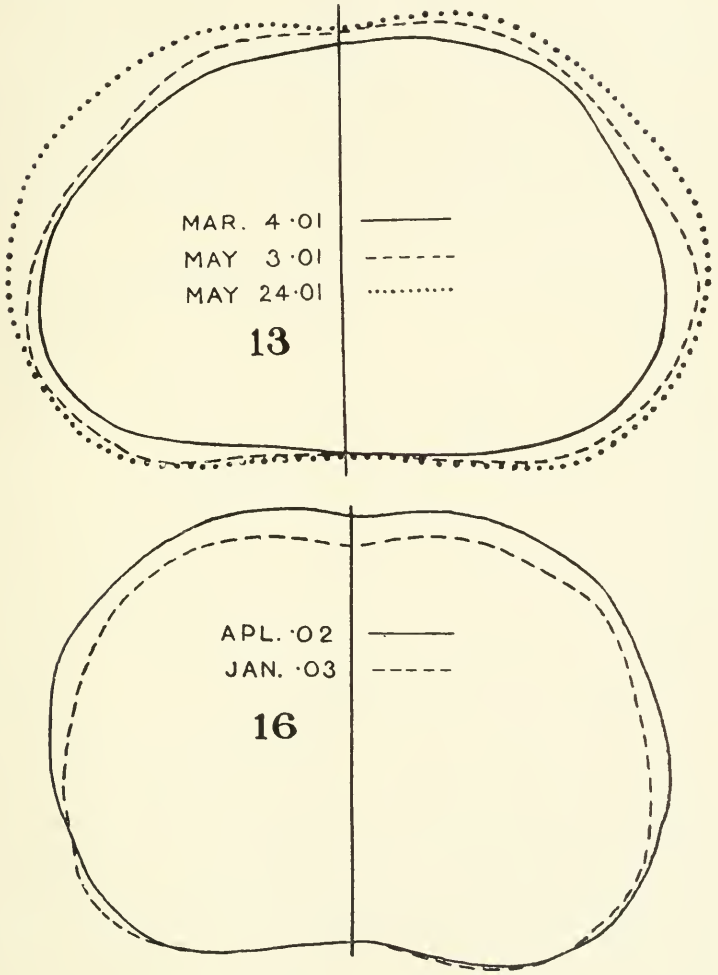
few charts picked from a large number collected during the five years' systematic use of the cyrtometer on my cases.



A few sample tracings are appended to give a slight idea of their utility. The broken line in each instance is the later tracing.

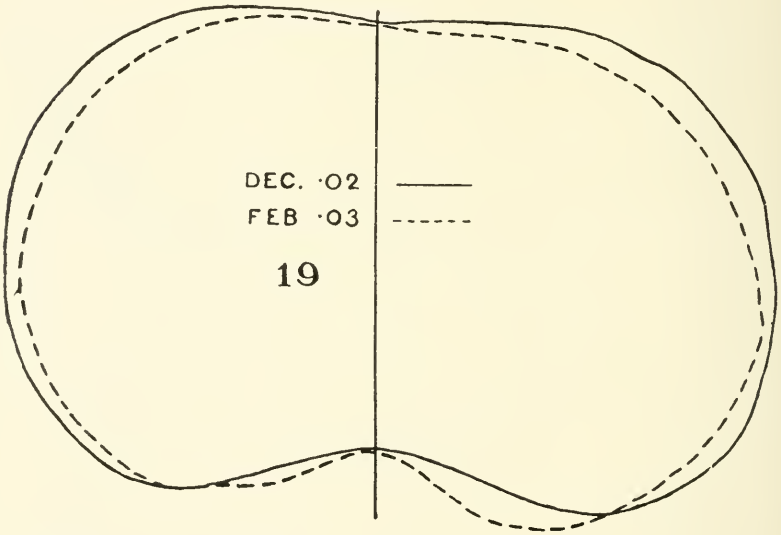
No. 2 is from a very severe case of bilateral pulmonary

tuberculosis, which on arrival was becoming rapidly worse. The excellent improvement is very graphically shown by the superimposed tracings.



This case went on to a cure which has been maintained to date two and a half years. In this case there was no deepening of the thorax, but a marked bilateral widening.

No. 11 is the tracing from a severe case of tuberculosis, and shows the deepening and widening which were coincident with a marked improvement in signs and symptoms during an outdoor rest cure, though the ultimate prognosis is doubtful. No. 13 is from the chest of a gentleman with non-resolving pneumonia of the left lung, with slight right apex catarrh and left lateral empyema. The first gain, as is the rule, is seen to be on the least affected side, and is, as it were, compensatory, the affected side gaining little or



nothing. The second shows marked re-expansion of the left side after the evacuation of the empyema. No. 16 shows the gradual contraction which can take place despite the improvement of the patient, where there is a fibroid process with gradual shrinkage. This patient went through a severe tuberculosis of the lungs and larynx, and is now doing missionary work in the Asheville Plateau, and shows a steady improvement and I expect an ultimate recovery, and yet

there will doubtless be further shrinkage of the thorax. Such fibroid cases, however, are the only ones where a decreasing perimeter can co-exist with improvement in the general condition. Generally shrinkage is a bad prognostic sign. No. 19 shows a case where shrinkage took place in the chest of a young man with tuberculosis, in whom the process was spreading and the case losing ground.

I regret that the space in the TRANSACTIONS forbids the exhibition of a larger selection of tracings from the many in my records, but I trust these may be of sufficient interest to excite others to make a systematic use of this most valuable instrument.

HOW TO POSTPONE THE DEGENERATIVE EFFECTS OF OLD AGE.

By DR. J. MADISON TAYLOR.
PHILADELPHIA, PA.

A REVIEW of the phenomena of advancing years points clearly to the line upon which these may be in part controlled or delayed. It is not to be expected that we can secure the co-operation of most, or indeed many, people, in pursuing preventive measures. If that were possible, and when it is possible, great things can be accomplished. However, certain principles obtain here which should be outlined, so that whosoever may see fit to do so can follow these suggestions to his advantage. It will be found that those who have studied this subject most carefully agree that normal bodily exercises are not to be forbidden, but rather encouraged. *Per contra*, if bodily activities are not pursued there must inevitably follow much more rapid retrograde changes in all the tissues. In respect to the diet, it is universally admitted that after middle life the amount of food taken should be less than before that time, and the changes in the diet should be rather to use less of the structure-forming material, though not always to exclude them. Again, there should be used relatively little, indeed as little as possible, of stimulating articles of food, which make more for acceptability than necessity. In short, the simple rule

should be observed of eating no more than a perfectly normal appetite craves, and as little as possible of those things taken solely because they are agreeable. As the period of old age is reached, by which is meant about 70 years, the regimen should be markedly simplified and always taken with the greatest deliberation. A general rule is recognised to obtain in most cases, that the more nearly the diet is reduced to bread and milk and fruits the longer will the person live and enjoy good health. It must be borne in mind, however, that exceptions will occur, and where the strength is being rapidly lost from any cause it is wise to increase the variety and encourage food taking until the strength is restored to the normal for the age reached. The digestive processes, as well as all the processes, are slower in advancing years. Some persons can get along best with long intervals between feedings; others, the majority, do better by taking small amounts of food at short intervals. The evacuations appear lacking in activity, and must be encouraged but not forced by purgative or strongly diuretic drugs. This is best met by suitable articles of diet, bulky and yet not calculated to produce fermentative change. This quality is found in fruits, nuts, cereal compounds and salads. Probably the best drink is buttermilk, which seems to have a salutary effect on the action of both the bowels and the kidneys. Next comes koumyss or zoolak, upon which I have known some elderly folk to subsist almost entirely for years. It is easily made at home, and can be thus supplied fresh and sound, and is within the reach of all, poor as well as rich. Of the cereals, Indian meal is in some respects the best, either in the form of bread or porridge. The question of the red meats must be studied with regard to the peculiarities of the individual, but they are needed very little, usually not at all. Of fluids, these are best taken in abundance, but where the

heart is weak it is not wise to take much before exercise, as at this time they throw a perilous strain on the cardiac structure. Medicated waters are oftentimes useful, but the less inorganic drugs enter into the system the better. The habit of constantly using lithia salts, exerting as they do a certain form of irritation, is to be condemned. If arterio sclerosis is present the vaso dilator drugs are useful, also the solvents of the calcium chloride, especially in the forms of natural mineral waters. The care of the skin is of paramount importance, and the first desideratum is to employ systematic and thorough rubbing and brushing of the surface from head to heel. The flesh brush or mitten made of coarse towelling used by the patient for half an hour at a time, night and morning, serves many admirable ends, and is better than too much bathing. A good plan is for the patient before rising to employ this skin stimulus thoroughly while in the recumbent posture ; if preferred and he is strong enough, it is better done while sitting. The skin of old age tends to become harsh, rigid and dry, and after this effleurage it is well to rub into the body a certain amount of some oil, and it will be found that the skin will take up thus sometimes an enormous quantity. Olive oil is perhaps best, but preparations containing lanolin are excellent, especially if it is desired to increase the weight and aid accumulations of fat. Sometimes I have found crude petroleum useful where stimulation of the surface is desired. If the skin be hypersensitive, thought must be given and changes advised in these procedures until the skin becomes inured to the full amount of mechanical stimulus. Old people are sensitive to cold, because their surface resistance is lowered and their heat-producing powers waning. The tendency shown by many to stay indoors and keep themselves over-protected and over-clothed is a grave error. This habit should be overcome gradually but

firmly, and they should be in the open air as much as possible and the clothing used sufficient but never too much. This is particularly true of underwear, which should be light and porous, preferably linen next to the skin, and can be supplemented by extra woollen underwear placed over this to vary with the conditions of the temperature. Outings are essential to encourage free oxygenation through the lungs and the skin. Chill of surface is much more likely to follow exertion where too much or too heavy underwear is used, and the results are far more serious than if there is too little. If the skin be leaky, becoming readily moist on exertion, excessive precaution must be used lest secondary chill follow. If the underwear is made damp by exercise it is important to change this as soon as possible and whenever it is produced.

The most important specific recommendations I wish to offer for the postponement of the degenerative effects of age and for the recovery of so much of the normal vigour as is possible in each, have to do with the forms and qualities of the exercises. As has been shown, the tendency of the tissues in advancing age is toward a steady and irretrievable hardening or stiffening or loss of elasticity, due to normal or abnormal increase in the connective tissue. The results of these are seen not only in the rigidity of the spinal column and ligaments, the skin, the muscle sheaths, the structures of the blood vessels, the parenchyma of the great organs, &c., which are obvious enough, but the really disastrous effects are those brought about by this xerosis upon the organs concerned in the processes of nutrition and of the special senses. This point I do not see brought out in any literature which has met my eye. Let me illustrate thus: We have as age creeps on a loss in cellular activity in the functions of the special senses, well shown for example in dimness of vision, loss of hearing and slowness of cerebration.

Much of this is inevitable and must continue. Some of this, however, can be delayed almost indefinitely. It will be observed that the tissues about the neck of an old person exhibit conspicuous loss of elasticity, so markedly that oftentimes dense rigidities are present, especially in the nuchal region.

I have been surprised and gratified to find that regulated movements of the neck and upper truncal muscles employed for the purpose of accomplishing something else, resulted in a conspicuous improvement in hearing, in vision, in cerebration, and as a consequence in the betterment of cerebral circulation, also in sleep. Following this thought I have repeatedly been able to promise, and fulfil the promise, that an individual who had suffered impairment in these particulars should enjoy distinct improvement by employing regulated movements.

What is true of these structures is equally true of the abdominal viscera. A large proportion of the digestive disturbances, even of those in earlier middle life, is due to a relaxation in the supporting tissues of the great organs of the abdomen. It is estimated that dilatation, and letting down of the stomach, will be found in 60 per cent. of all adult persons. Oftentimes there are no symptoms indicating this, but when present they point towards a series of disturbances, resulting from loss of muscular quality in the stomach itself. In those whose abdominal walls are feeble the organs have a tendency to sag and droop. This produces a series of alterations in the relationships of the organs, and particularly of the blood vessels and the structures concerned in their function. In the case of the kidneys whose support is largely through the vessels which enter and leave them, and whose shape is so nearly spherical that they move readily, the suspensory tissues are not seldom twisted, thus shutting

off the passage of waste material and interfering with the actions of the nerves to the extent sometimes of causing pain and suppression of the function. In females this tendency to ptosis falls seriously upon the genito urinary cycle, hence the uterus and ovaries are thrown out of their normal adjustments. In women who have borne children the abdominal parietes have all suffered more or less overstretching, and the slackening of these supporting tissues works more or less mischief and discomfort. In some men, too, this is experienced. It becomes conspicuous where faulty attitudes are added to the structural defect. I have elsewhere expressed my opinions more fully on this and offered suggestions for relief (*Philadelphia Medical Journal*). These visceral ptoses are recognised as of large significance, and their remedy is a matter of increasing importance. It can be seen at a glance that misadjustments of the abdominal organs require attention, sometimes to a very pronounced degree. The first means of relief sought by women is by the use of various forms of the corset. This garment is so universally used that we are compelled to accept it as a necessity, although I am of the opinion that we could get along very well without it, if it were possible to bring women to believe so. However, the main thing is to induce women to use those corsets which will do least harm. A certain amount of harm inevitably must follow the use of a needless artificial support. The walls of the abdomen should be competent to support the contained viscera. Where these walls are notably defective they should be supported artificially only until they can be trained to do the work adequately for which they were constructed. It is an axiom that all artificial support is merely for the purpose of conserving function until the tissues can be brought back to the normal. The first thing to be acquired in getting rid of these defects is

to teach the person to stand correctly and continue to maintain proper attitudes under all circumstances. Wherever there is a stooping attitude maintained without effort at holding the abdominal organs in place voluntarily, there is a tendency for the abdominal viscera to pour out over the brim of the pelvis, which is thus necessarily in a slanting position.

If the neck-bone is held straight, the ribs well lifted, and a moderate degree of tension exerted upon the abdominal walls, the viscera will rest upon, and within, the confines of the pelvis, and this position should be learned and practised; nor is it at all difficult if the attention is directed that way and some little familiarity acquired in maintaining the correct position. The body cannot be held in normal attitudes unless the skeletal muscles are in fairly good tone.

It will be obvious to anyone that those persons who habitually maintain an erect position in standing or sitting are stronger than those who stoop and slouch. It may be said that many of these last are perfectly well and strong, and it must be replied that they are not as well and strong as they should be; and, further, that their abdominal tissues are in perpetual danger, because any organ, or part of the body, which stands outside of its normal adjustment comes closely to being in the relationship of a foreign body, and cannot be so well protected by the central nervous control mechanism. Again the position of the organs in the thorax subject them to less danger than those of the abdomen, because they have a well constructed box to dwell in, but nevertheless they, too, are exposed to a good many perils if out of alignment. A person who stoops and allows the shoulders to sag down and forward, and the ribs to fall back toward the spine, shortens the antero-posterior diameter of the thorax anywhere from two to three inches. It needs little demonstra-

tion to show that the lungs, heart, great vessels, and other important structures in the thorax cannot live, and move, and have their proper being, under such circumstances. Not only so, but prompt and adequate attention to these conditions will result in not only improving the general health, but also in maintaining symmetric functional action, and the postponement of senile changes in the connective tissue. In short, all these facts are rehearsed to give prominence to the conclusion, which seems to me inevitable, and abundantly demonstrated by data in my experience that attention to proper attitudes, involving economies in interorganic relationships, is the one fundamental factor in postponing senile changes. The physiologic reason for urging care and persistence in retaining elasticity of tissues is to be found in the fact that sclerotic changes, and faulty attitudes, combine to interfere with peripheral vascular competence as well as peripheral innervation. To recur for a moment to the illustration used above, of the marked improvements following increased flexibility in the tissues of the upper thorax and neck, it is my opinion that this is to be brought about by thus promoting and encouraging fuller circulatory interchanges, especially of the lymphatic channels. I am also of the opinion that arterio sclerosis is thus postponed, and sometimes prevented, hence the same principles hold good throughout the entire economy. It may not be necessary to develop this thought further, but to assume the truth of what I regard as an original observation, that systematised efforts at elasticising of the tissues are the basis upon which sclerotic changes generally can be delayed and made less. The means by which this result is to be attained consist chiefly in employing movements taught by a skilful person, and this should be the physician himself, assisted it may be by an expert,

trained by him to do the work in detail. Free exercises in the open air proportional to the capacities of the individual, are of the greatest importance, and should be regulated with the same care and supervised with the same conscientiousness as any other medical measures. Among those of the utmost importance are the prescribed movements, which differ in degree at least from the ordinarily employed remedial movements whose main object is to improve muscular tone, and which are largely flexor for the arms, with only a moderate degree of extensor activities. For older people there should be a steadily increasing attention to the extensors of the arms and less action demanded of the flexors. First these should be passive in the form of stretchings, rotations and torsions applied to the limbs and trunk and neck. These should be moderately supplemented at first by voluntary movements in the same direction. Later, as the vigour improves, and the heart action is strengthened, and the blood vessels recognised to be better able to stand the increased vascular tension induced by exercise, these may be employed more forcefully, until, by and by, the patient, even when well advanced in years, can endure a degree of muscular work which is surprising. Not only so, but this results in a feeling of well marked enjoyment not only of the results in improved circulation and in increased resistance to temperature changes, but in the procedures themselves, which come to be distinctly enjoyed. In this connection let me say a word about the senile heart. It is generally accepted in a fatalistic sort of way that old people are unfit for activities, that they must do as they are inclined to do, little or nothing but exist, like a vegetable. My own experiences and convictions in this particular seem fortified by the best authorities consulted. In my opinion the disinclination to movement and effort is rather the result of under-oxygenation, a habit, or other

conditions which make for what one may almost call laziness, than an instinctive economic impulse. It is obvious that the healthier and happier old people are those who are reasonably active. It is my experience that where activities have been encouraged, always with full estimation of the limiting conditions present, most improvement results. This is true, and demonstrated to be so, under circumstances which would ordinarily be considered prohibitive; for instance, where there have been observed those phenomena supposed to indicate threatened apoplexy, however that term be interpreted. I have had a number of cases under observation for many years where I was originally consulted for a train of symptoms which pointed towards cerebral changes such as vertigo, lapse of memory, sensory disturbances in hearing and sight, formications, paresthesias, periods of brief unconsciousness, &c., in people of seventy years or more. Ordinarily the treatment advised for such conditions would be to reduce the individual to live the life of a hothouse plant. I have found in this contingency great practical advantage in attending to cutaneous elimination especially by frictions, oilings, massage, passive movements. carried on to all full stretchings as described above, and gradual increments of stretching exercises, forceful extensions, and finally, free movements and open air life. Some of the individuals are now past eighty, strong and well. Even where there are found to be alterations in the kidneys, sometimes albumen, casts and sugar, the encouragement of peripheral vascular stimulus was followed by the happiest results. Above all, in the cardiac arrythmias attention to the skin and regulated movements reduce these and sometimes cause them to cease. The pulse in old people, as has been said, is quicker than in middle life. The average of those cases reported by Humphrey, all of them over 80 years of age,

was for men seventy-three per minute, and women seventy-eight, and the average respiration was seventeen. The proportion of regular to irregular pulse was four to one. I find irregularity in the pulse more commonly, indeed, it is generally present more or less, even in the healthiest. Humphrey also found in the majority of old persons examined little or no change in the arterial system. Clifford Allbutt makes the assertion that in many cases of extreme age no evidence of arterio sclerosis is to be found. One of the oft-recurring phenomena of old age is œdema, due to loss of vascular tone and defective lymph circulation. This condition would be much less frequent if the tissues, especially the larger muscles, were kept in a condition of elasticity, thus relieving direct pressure and occlusion of the contained avenues of circulation. The exhaustion after fatigue is not well recovered from in the aged, and hence it is not permissible to maintain protracted activities, and they should be supplemented by periods of rest, and if the heart be not strong this should be taken lying down ; but this is no reason to encourage complete inaction. Again, the change characteristic in the bones of the aged, their loss of weight due to diminution in size, the walls of the shaft becoming thinned throughout from within, especially toward the ends of the bones, as at the head of the femur, forbids strong muscular exertion such as lifting. Nor should activities be sudden and severe, otherwise there is danger that a false step and a fall may result in shock or fracture, or both. Nor is it important or desirable that the muscles should be kept at their full strength, even if it were possible. The quality of musculature is mainly desirable for purposes of oxygenation, and to maintain freedom from stiffness and the consequent compression upon blood-vessels and nerves. In short, the component parts of the machine in healthy old age are slowly

and equally weakened. They respond imperfectly to ordinary calls, the centres failing less early than the outer parts; but these same centres should be maintained at their best for so long as it is possible. Finally the wheels of the machine stop. This slow decline is really a beautiful spectacle, and requires for its fruition the sheltering influences of civilisation and sympathetic care. In the conditions of primitive society man died even as the animals and birds die, the weak by the hands of the stronger. When assailed by sickness or age, death came swiftly from one or another agency of Nature, usually from animal or man. In civilisation life can be conserved indefinitely, or at least to well up toward the century mark, provided the aged persons exercise judgment in the manner of life lived, and if cut off before a reasonable time the fault lay within themselves or their circumstances. In this slower decline it becomes more possible for disease and decay to manifest themselves, but even here prevention is a large possibility. If the heart or the digestive organs be disproportionately vigorous they will overload and press the other organs, and one of these, the weaker one, will give way.

The use of inorganic drugs has little place in relieving the grave disorders of the old. When these are used in the form of the natural mineral waters they have, since time immemorial, been held in high esteem for more or less definite and indisputable good effects, the nature of which has never been satisfactorily explained. Modern studies on the physiology of the blood, especially of the serum, help to account for this. Recently Trunecek, of Prague, has announced a method of treating the phenomena of arterio sclerosis which has been not only successful but suggestive, and seems to me to throw light on the value of some mineral waters which will prove a rich field for research. His thesis is that certain salts can be introduced into the blood current which shall aid in dis-

solving the calcium phosphate found in the structure of the sclerosed vessels. Hence he adopted the plan of throwing into the circulation direct, by hypodermoclysis or intravenously, a strong solution of sodium phosphate and magnesium phosphate, which are found normally in blood serum but only in minute quantities. His followers have obtained gratifying results, and many modifications are made of his original solution. Leopold Levi used this by the bowel and the mouth, and it was found that the latter gave just as good effects. He used for internal administration cachets of sodium chloride 10 grammes, sodium sulphate 1 gramme, sodium carbonate 0·40 gramme, sodium phosphate 0·30 gramme, calcium phosphate and magnesium phosphate, of each 0·75 gramme, divided into cachets No. xiii.; of these two or more a day are given.*

Under this treatment the usual discomforts and evidences of disturbed circulation, such as dyspnœa, asthma, vertigo, angina pectoris and prostration rapidly lessened or disappeared, far better than by the use of iodides and nitrites, although it occasionally happened that when these last were also used the progress was more satisfactory.

It occurred to me to review the analysis of the various mineral waters, and I was surprised to find how many of them exhibited likewise many of these ingredients, in varying proportions, along with one or other factor to which the virtue of the water was chiefly attributed. Hitherto these factitious items have been regarded as indifferent, or to them has been attributed various hypothetic or conjectural reasons. We have been long recognising that the use of certain of the alkaline waters lessened the acidity of the urine, and presumably of the blood, and the laity have been taught, partly by the profession, but chiefly by the manufacturing chemists

* I use these subdivided into twenty with better effect.

and the public press, that if ever the demon of uric acid can be laid, by the ingestion of enough of lithia salts or some of the new and wonderful substances, the special products of the factory, their imperilled lives can be saved and most ills removed. The reaction against this notion has set in, but the fad remains, and will prevail long among the people, and the non-reading of the profession, that alkalies are helpful in a vast variety of vague states, accompanied by the output of uric acid in the urine common to about one-fifth of the community. The real point of effort should be the restoration of the functional activity of the liver, which has to do with the conversion of ammonium cyanate, uric acid, and other end-products into urea.

This is to be accomplished in a number of ways, the basis of which is to bring about bettered circulation in the liver and more complete functional power. There may be, and there seems that there is, considerable efficacy in the use of natural mineral waters which exhibit a reasonable proportion of those salts which exert a solvent action, lime salts or other adventitious substances. Drugs, however, serve a temporary purpose, and in such conditions as the discomforts arising in beginning degenerated processes of age would seem to need an indefinite continuance. The real curative remedy and defensive measure is in aiding oxidation of the tissues by all rational means, special movements, and stimulation of the vasomotor mechanism of the great eliminating organs.

LEPROSY IN THE HAWAIIAN ISLANDS.*

By JUDSON DALAND, M.D.

PHILADELPHIA.

Leprosy has existed in all the Islands of Hawaii for many years and was first officially recognised in 1840, and it is generally believed that it was imported from China. As the disease spread rapidly a Board of Health was organised in December, 1850, with power to insist upon segregation of all suffering from this affection, in consequence of which act the malady is gradually disappearing. All leprosy suspects are sent to Kalihi, a receiving hospital near Honolulu, where they are examined by a Medical Board, and the lepers are transferred to Molokai.

Despite the earnest efforts of the Board of Health an unknown number of lepers exist in the different Islands of Hawaii, which number, however, is steadily decreasing and are now fewer than at any time in the past. Many of the suspects present conditions rendering diagnosis extremely difficult. This is especially true in certain of the early cases complicated by diseases of the skin, such as psoriasis, cholasma, scabies and erythema. Reliance is placed not only upon the characteristic changes that are observed in the skin, mucous membrane and nerves, but special importance is attached to

* Read before the American Climatological Association, at Washington, May 14, 1903

the discovery of the bacillus of lepra in discharges from the skin or mucous membrane, and also in small portions of excised skin. The bacilli are discovered, usually with great ease, in the skin from the external auricle when this portion of the body is invaded. The recent observations of Boston* would suggest the advisability of more frequent and thorough examinations of the blood for the lepra bacillus in suspected cases.

Dr. Jonathan T. McDonald,† of Honolulu, summarises the diagnostic signs of leprosy in Hawaii as follows :—

(1) The microscope is the supreme agent of the final diagnosis of leprosy. No patient should be committed to a segregated colony without a bacteriological demonstration of the disease.

(2) Of clinical symptoms, maculæ, chiefly leucodermic spots, are found in 89 per cent. of all cases.

(3) The lepra nodule found in 74 per cent. is the one chief distinguishing lesion of skin leprosy.

(4) Thinning or complete loss of eyebrows and lashes is present in 63 per cent.

(5) Atrophic changes in hands and forearms, with retraction and contraction of fingers and enlarged ulnar nerve in 32 per cent., a leading feature of nerve leprosy.

(6) The plantar ulcer found in 26 per cent., usually on the ball of the foot.

(7) Absorption of phalanges in 16 per cent., with occasional spontaneous amputation.

(8) Elephantiasis of hands and feet in 16 per cent.

(9) Facial paralysis in 11 per cent.

* "Lepra bacillus in the Circulating Blood," *Medical Bulletin*, vol. xxv., No. 2, February, 1903.

† "A Diagnostic Examination of 150 Cases of Leprosy," *Journal of the American Medical Association*, June 6, 1903.

(10) The entire body should be carefully tested for anæsthetic areas.

(11) Several of the above symptoms can be found in some slight degree at least in every leprous subject.

The Hawaiian possesses a peculiar susceptibility to leprosy. The number of whites that are afflicted are few, and strangely enough, but few Chinese have been affected with the disease. The census at Molokai from 1866 to 1885 shows 2,997 Hawaiians, 37 mixed Hawaiians, 16 Whites, 22 Chinese, and 4 other nationalities. It is somewhat difficult to accurately determine the result of segregation by a study of the statistics of the past thirty-seven years, because of the great variation in the population from time to time, and the extraordinary influx of Chinese and Japanese coolies; further, no accurate census existed as to the number of lepra in the Islands in 1865, when segregation was first introduced; and, in like manner, despite the earnest efforts of those in authority, the statistics of to-day are only approximate, as many lepers are concealed by relatives or friends so as to avoid being sent to Molokai. The number of committments during the past ten years shows a gradual decrease. During the year 1900 the number of committments was 85, whereas in 1891 there were 132.* It is the belief of those who have to do with leprosy in Hawaii that segregation has reduced the number of lepers on the island.

I desire to express my thanks to the President of the Board of Health at Honolulu, and to Dr. L. E. Cofer, of the Marine Hospital Corps, through whose kindness I was permitted to visit the leper settlement on September 4, 1902.

The island of Molokai is south-east of Oahu and north-east of Maui. The surface is mountainous: its length is 35 miles and its area 270 square miles. A small peninsula, projecting into the ocean from about the centre of the northern

* *Public Health Report*, U.S. Marine Hospital Service, October 11, 1901.

coast of the island, was set aside for the lepers by King Kamehameha in 1865, and has an area of 8 square miles. The breadth at the base of the peninsula, where it joins the cliff, is $2\frac{3}{4}$ miles, at the centre $2\frac{1}{2}$ miles, and it measures 1 mile in length. It is shut off from the remainder of the island by a bold, rugged mountain range, extending from the east to the west, having an altitude of from 2,000 to 3,000 feet. With the exception of a rough, steep trail, which is almost impassable, no land communication is possible between the leper settlement and the rest of the island. Communication with the outside world is maintained by a small steamboat, the "Lahua," which, during pleasant weather, calls at this port semi-weekly. In bad weather it is impossible to make a landing, so that frequently isolation is complete for several weeks. The shore is lined with large rocks, making a rather dangerous approach, and the landing of passengers and cargoes is effected by means of small boats. The soil is composed of disintegrated lava and sand, and is made to yield tropical fruits and vegetation by irrigation.

Abundance of water is supplied by reservoirs fed by streams from the mountains. As the boat approaches the Settlement the appearances of the villages differs in no wise from that of similar villages in other parts of the island. The combination of bright sunshine, cloudless sky, mountainous scenery in close relation with the ocean, in which are numerous rocky islands of all sizes, together with luxuriant tropical vegetation and fruits, presents a scene difficult to surpass anywhere in the world.

The census of leprosy in Molokai in 1901 was 1,073. Of the 164 non-lepers, 78 were children of leprous parents, 67 helpers, *i.e.*, those permitted to live and care for the lepers; and the remaining 19 included the Superintendent, the Physician, the Priests, Lay Brothers, Sisters and Teachers.

The total population is 1,237. The Superintendent, J. V. McVeigh, informed me that there was 861 lepers on September 4, 1902, a decrease of 212, of whom about 750 were native Hawaiians. About 600 of the lepers live in Kalaupapa, which is the residence of the Medical Officer, Dr. W. A. Goodhue, the Superintendent, the Priest of the Chapel of St. Francis, Father Wendelin (the successor to Father Damien), who is in his sixteenth year of service, and Mother Marieanne, who has been in charge of the Bishop's Home for girls with leprosy for fifteen years, and who is assisted by three Sisters. At Kalawao, the original settlement, there are about 200 lepers, in which place lives Mr. Dutton, who has been in charge of the Baldwin Home for boys for seventeen years. The chapel is in charge of Father Joseph, assisted by four Lay Brothers.

The unselfish labours of these men and women are of the greatest value to the lepers, and I take this opportunity of expressing my appreciation of the excellence of their work, and my profound admiration for each of them individually.

It is difficult to imagine a more ideal spot for a leper settlement than that of Molokai, isolated by Nature's barriers, the mountains and the sea; situated within the tropical circle; and possessing a climate admirably suited to those suffering from this disease, and standing in strong contrast to the climatic conditions under which the lepers exist in Iceland, Norway and India.

The life led by this community is similar to that of the villagers in non-leprous regions, and they possess churches, schools, courts and jails. Three baseball teams testify to the popularity of our national game; ping-pong is played with enthusiasm; and many devote themselves to fishing, rowing, hunting, horse-back riding and driving. Most of the members of the community seem happy and contented; and

Fig. 1.—Characteristic physiognomy of leprosy.

Fig. 2.—Leprosy in a girl aged eight years, showing the characteristic physiognomy of leprosy.

Illustrations furnished by courtesy of "The Journal of the American Medical Association."

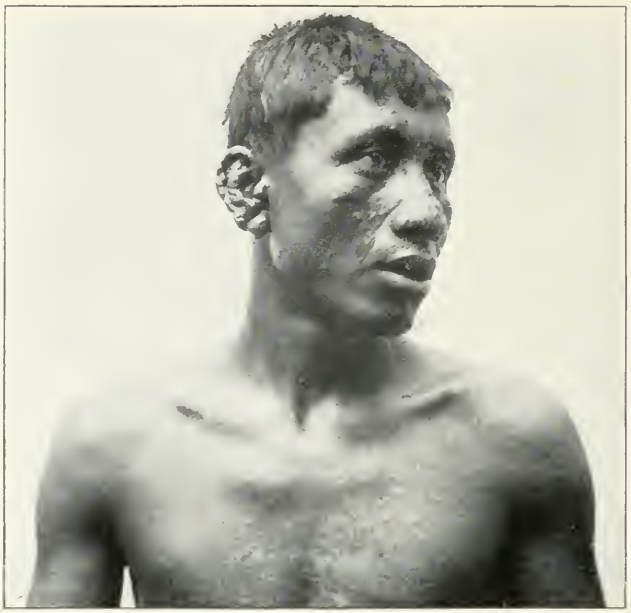


FIG. 3.—Tubercular leprosy of the face and ear.

Fig. 5.—Macular leprosy with palmar ulceration and absorption of the terminal phalanges.

Fig. 6.—Leprosy, showing the characteristic plantar ulceration and changes in the fingers.

FIG. 7.—Leprosy, showing the leonine expression, loss of the eyebrows and deformed hands.

their love of music is shown by the existence of a village band and singing societies. Although the lepers are cared for at the expense of the Government, more than 17,000 dollars was expended in the general store for additional supplies for twelve months. Many of the lepers or their relatives are in possession of moderate fortunes.

The customs of the Hawaiians are such as to facilitate the spread of leprosy, as for example, the use of the family pipe, which is passed from one member to another; the carrying of food to the mouth by means of the fingers; and the general want of cleanliness. It is believed that heredity plays a very unimportant *rôle* in the spread of the disease, as many children born of leprous parents remain free from the disease, more especially if they are removed from their parents at an early age. In 1884 there were twenty-six children born in the settlement, one or both of whose parents were lepers before each birth. But two developed leprosy, despite the fact that they had lived in the houses of lepers all their lives. This view is supported by Dr. Carleton, who has had twenty years of experience with leprosy in India, and has seen ninety-two children of leprous parents, only two of whom developed leprosy. The majority of observers in Hawaii believe that leprosy is contagious, which view is supported by the observations of Arning, who inoculated Kenan, the condemned criminal, who two and a half years later showed leprous changes in the skin and in various parts of the body, and died of the disease at Molokai. Unfortunately, this experiment is vitiated by the occurrence of leprosy in his mother-in-law, his son, and his nephew. The historical case of Father Damien, a Belgian, who died of the disease seven years after its first appearance, and the occurrence of ten cases of leprosy in ten years among non-leprous individuals in the Settlement, demonstrates the contagiousness of this disease. At the

present moment there is no example of a case of this disease having been contracted in the settlement, despite the fact that a number of individuals living in the settlement have been exposed to the disease for periods of fifteen, sixteen and seventeen years. The non-infection of a woman who was successively married to three leprous husbands tends to prove that this disease is but feebly contagious. There is a widespread belief among the physicians in Hawaii that syphilis greatly increases the susceptibility to leprosy, and this is believed to be a part of the explanation of the Hawaiian's susceptibility to the disease. The white race enjoys a remarkable immunity, and when proper hygiene and good food is secured, the Hawaiian's susceptibility decreases.

Leprosy became widespread during the small-pox epidemic in 1852, owing to careless vaccination. It is believed that the disease may be transmitted by the secretions, by cohabitation, and by insects, more especially mosquitoes and flies, and that the portal of entry of the bacillus may be the nares, the mucous membrane of which may have become accidentally abraided by the finger-nail, or through the skin, which may have been injured; but in truth, the exact method of entry and transmission of this poison is in most cases unknown. Recent observations show that an enormous number of bacilli are found in the nasal secretions when these parts are affected, suggesting that this is an unsuspected source of great danger. Dr. McDonald has examined the mucus from the cartilaginous portion of the nasal septum in a number of cases of leprosy, but he has rarely found the *bacillus lepræ*. As in other leper settlements, the varieties of the disease are the tubercular, anæsthetic, and mixed; the tubercular variety is most common. Since the establishment of this Settlement many forms of treatment have been tried from time to time, but without success. At present the patients are bathed two or

three times daily in warm water, and internally the Goto treatment is employed, the composition of which is a secret. This treatment is apparently beneficial, but is not curative. The tubercular ulcerations are treated antiseptically. There is a widespread belief, however, that the Kausatsu baths in Japan are of decided benefit. Certain of the cases of leprosy appear to be self-limited, and it is believed that this explains some of the cures that have been reported. The majority of observers believe that segregation prevents the spread of this disease. The following conclusions have been deduced from observations made in Molokai and represent the prevailing opinion in Hawaii :—

(1) That the *bacillus lepræ* is the cause of this disease.

(2) That this disease is feebly contagious.

(3) That the Hawaiian is peculiarly susceptible to leprosy.

(4) That the Caucasian possesses a high degree of immunity.

(5) That syphilis predisposes to leprosy.

(6) That heredity is a factor of little or no importance in the causation of this disease.

(7) That segregation prevents the spread of leprosy.

(8) That the precise manner in which this disease is ordinarily transmitted from the sick to the well has not been proven.

(9) That there is no cure for leprosy.

(10) That benefit may be derived from good hygiene, good food, climate, hot baths, and the antiseptic treatment of ulcerative surfaces.

BRADYCARDIA AS A SYMPTOM.

By ROLAND G. CURTIN, M.D.

PHILADELPHIA.

Bradycardia may be defined as a condition, more or less transient, that results, probably through some influence of the nervous system, in a reduction of the pulse rate below the number which is accepted as normal—64 to 72.

The study of bradycardia does not properly include those cases in which the patient's pulse-rate is naturally slow. Some persons have acquired a slow pulse by inheritance. In such cases this symptom is present all the time, when the patient is in health. I have seen two examples of this kind in the children of drunkards.

The interest in bradycardia has greatly increased within the last few years. The older text-books have nothing to say on the subject, or give it but a passing notice. The only articles of importance referring to it that I have seen are in the works of Dr. Sansom of London, and in a recent book by Dr. Robert H. Babcock, on "The Diseases of the Heart and Arterial System," published by D. Appleton and Co., of New York City. The attention given to bradycardia in this book indicates an increased interest in it by clinicians. I have, during the past ten years, made some observations which are embodied in this short paper, and presented for your discussion, hoping primarily to assist in adding to the literature, and calling your attention to the importance of placing this interesting symptom in its proper position—I

call it a symptom, as it cannot *per se*, be called a disease in the light of what we now know of it.

Dr. E. W. Watson and the writer were, I believe, the first to point out the slowing influence of influenzal poison upon the heart—not, of course, in every case, but as an occasional manifestation of this strange disease.

In an article read before the American Climatological Association in Session at Washington, D.C., September, 1891, we made note of the fact that "the heart was often irregular, slow and feeble. These symptoms indicated want of nerve power rather than impaired muscle, since recovery was so generally rapid."

Again, in another paper, read January 13, 1892, before this Association, we said that "in 1889 and 1890 several cases were seen of irregular, rapid and slowed heart. The slowing of the heart did not seem to be influenced by the temperature, but was apparently the effect of a toxine upon the nerves of the heart. The influenzal poison rarely excites the heart in an uncomplicated attack. Ordinarily the temperature may be 103 or 104½°, and the pulse at the same time 70 to 85, generally about 78 to 84." Since the publication of these articles I have seen many cases of influenza that have had marked bradycardia.

In one of these, the patient, a man, aged 60 years, had for a month a marked attack of influenza, with bronchial catarrh and great nervous prostration. His temperature had for six days ranged from 103 to 105,° and his pulse during the same period has been about 30. After that, it went up to the normal point.

Another case, a physician, had an attack of that disease, in which his pulse ranged from 35 to 40 for three months. At the same time he had a temperature from 1 to 2½° below normal. He also had marked glycosuria, which has con-

tinued off and on since, making the appearance after indiscretions in diet. Following the early attack, he had transitory anginose symptoms.

These cases are given as examples of the influence of the influenzal poison as a cause of slowing of the heart by means of its toxic effect upon the inhibitory nerves of the heart.

You will observe that although one of these cases had considerable fever, and the other a persistent subnormal temperature, the same symptoms of bradycardia was associated with both of them.

In the Philadelphia Hospital, in the fall of 1902, a man was admitted with acute lead poisoning, accompanied with marked bradycardia. The nervous symptoms in this case were very pronounced. His pulse was slowed to between 30 and 40 during the period in which he was in the hospital. There were no symptoms of renal complication. After having been in the ward for about six days he died of nervous exhaustion, in which delirium had been a pronounced symptom.

I desire to mention briefly four cases of Stokes-Adams' syndrome—a group of symptoms prominent among which, as you know, are paroxysmal bradycardia, faintness, syncope, or epileptiform convulsions, with partial or total respiratory failure.

I have the notes of a case in which the patient, a man in advanced life, an inveterate tobacco chewer, had a severe carbuncle a year and a half ago. Since that time his pulse has been from 35 to 40. This bradycardia came on during his convalescence, and has continued since then. He has had many attacks of marked faintness. A few days ago he fell down in the street. He is extremely weak. Otherwise, he seems to be in good health. He has since died—in 1903.

In the fall of 1902, a man was found unconscious in the street and was brought to the Presbyterian Hospital. He

was 84 years old, and had several convulsions after being admitted, which were tonic in character. During the time that he lived he had about eighteen of these convulsive attacks. His pulse ranged from 13 to 104. He had a slight systolic murmur and marked arcus senilis. His arteries were markedly atheromatous. He had used both alcohol and tobacco to excess. The case was diagnosed as one of Stokes-Adams disease. There was a trace of albumin and a few hyaline casts found in his urine.

The following case was seen in the Philadelphia Hospital. A man, aged 62, born in Ireland; used alcohol to excess at times; no venereal history; on admission complained of giddiness, nausea, palpitation and anorexia. The most prominent physical signs were cyanosis, anasarca and slow pulse—under observation his pulse would fall to 30 or below during periodical attacks of vertigo. Without warning he was seized at the dinner table with a tonic convulsion lasting one minute. The following day he had a similar seizure, during which the pulse could not be felt or the heart sounds heard. Respiration also ceased. Under active stimulation, oxygen and artificial respiration, he become conscious and lived in comparative comfort for fifty hours, when he died in a convulsion.

I was called recently to see a woman, aged 77, who had a pulse ranging from 30 to 60—generally below 40. The heart sounds were sharp and quick, but almost inaudible. She has had three attacks of convulsions, involving the muscles of the mouth and hands, the first in last October, followed by one on November 28, and another on May 16 of this year. She did not remain unconscious for any length of time.

Bradycardia has been observed as occurring during the course of many acute and chronic diseases—typhus, typhoid and rheumatic fevers, pneumonia, diphtheria, influenza,

erysipelas, dyspepsia, gastric ulcer, gastric and œsophageal cancer, debauch and delirium tremens, malaria, acute and chronic lead poisoning, apoplexy, chlorosis, anæmia, and pernicious anæmia, gangrenous enteritis, jaundice, appendicitis, sea-sickness, diabetes, brain tumours, meningitis, paresis, insanity—specially melancholia, hysteria, hypochondriasis, homesickness of young soldiers—after exhausting fatigue, confinement and excessive sexual excitement. It may also be associated with diseases of the cardio-vascular system, arterio-sclerosis, Stokes-Adams disease and angina pectoris. It has been my experience that bradycardia is rarely noticed in uncomplicated diseases of the valves or orifices of the heart. When present it can usually be ascribed to large doses of digitalis or other cardiac remedies.

The late Dr. Eskridge, in an article on "A Study of the Temperature, Pulse and Respiration, in the Diagnosis and Prognosis of certain Diseases of the Brain" (reprinted from the *New York Medical Journal*, August 31, Sept. 7, 21, and 28, 1901), makes the following statements in regard to slow pulse in intracranial conditions.

"A slow pulse in organic brain disease generally indicates increased intracranial pressure. There is a probable exception in abscess of the brain, in which intracranial pressure often seems not to be increased. The slow pulse in this disease has been attributed to the poisonous and depressing effects of toxines on the brain, especially inhibiting the vital centres. It must also be remembered that a sudden increase of the intracranial pressure to such an extent as to overwhelm the functional activity of the brain, the heart uncontrolled, is allowed to beat away at its own 'sweet will.' A slow pulse of 60 to 80 is the rule in the exudative stage of acute meningitis. A pulse of from 40 to 60, especially if irregular and intermittent, as it usually is, denotes great cerebral

disturbance and rapid progress of the disease. These are the cases in which sudden death often occurs, apparently from the exudate either directly or indirectly, affecting the cardiac and respiratory centres. The slower the pulse in apoplexy, the greater the probability is that the stroke is due to hæmorrhage. The typical pulse of abscess of the brain is a slow pulse, until that stage is reached in which the functional activity of the brain is greatly impaired. In traumatism of the brain a slow pulse denotes in the majority of instances either hæmorrhage or a depressed fracture, and, if the pulse is irregular or intermittent, that the respiratory and cardiac centres are affected.

"It would be interesting to study in detail the irregular and intermittent pulse in organic disease of the brain, as illustrated by a number of well-observed cases, but time will not permit. Suffice it to state that neither a rapid nor a slow pulse in many cases has more significance in weighing the probable outcome of a case than the degree of irregularity or intermission of the pulse. The greater the prominence of these variations from normal the graver the prognosis."

The value of bradycardia as a help in diagnosis and prognosis can be stated in a few words. Enough has already been said to indicate that a symptom which is so common and which occurs in such a multitude of widely different diseases can be of but small diagnostic value. As an aid in prognosis it would appear that given a constitution not undermined by disease, and a gradual subsidence of the primary cause of the slow pulse, bradycardia need not necessarily be regarded as a particularly grave symptom On the other hand, however, if it is associated with, or caused by, a depressing chronic condition, especially of the cardiovascular system, it becomes a most serious symptom. When accompanied by anginose symptoms it is frequently followed by sudden death.

GROWTH AND DEVELOPMENT OF CHILDREN IN COLORADO.

BY DRS. CHARLES F. GARDINER and HENRY W. HOAGLAND.
COLORADO SPRINGS.

We have to offer in the following paper simply a preliminary study of the physical differences that exist in the development of boys and girls under different climatic conditions. We have therefore during the past two years, measured over one thousand public school children of Colorado Springs, Colorado, and compared the average measurements so found with the results obtained by Dr. W. S. Christopher, of Chicago* and Dr. William Townsend Porter, of St. Louis, upon a large number of public school children in those cities.

It is probably not necessary to mention the fact that climatologically considered there is a more marked and decided difference between the climatic environment of children living in Colorado Springs and those who inhabit the cities of St. Louis and Chicago, a difference great enough, we decided, to produce physical changes in Colorado Springs children, that a careful comparative measurement analysis would show especially when taken during the susceptible period of adolescence and upon organs of structure naturally adapted to be subject to climatological change, as the lungs and bony frame work of the chest under diminished atmospheric pressure, the weight

* *Transactions of the Academy of Science*, St. Louis, vol. vi., No. 12. "The Growth of St. Louis Children," April 14, 1894. "Report of Committee on Child Study and the Pedagogic Investigation," Chicago, Illinois. 1899.

and height as influenced by an excess of sunshine, out-door air and exercise. We regret that owing to our inability to find any reliable data regarding measurements of school children living in a small town in the East, we have been forced to make our comparisons with those of children living in large cities. We felt that possibly too much unproved theory regarding climatic effects such as we were studying had been indulged in and too much stated as a fact for which there was no scientific data. We have therefore endeavoured to be as strictly accurate as it was possible to be and to avoid the tendency to have figures fit with preconceived ideas. Our technique consisted in taking age, weight, height, inspiration measure of chest, expiration measure of chest, the thoracic perimeter, and time in Colorado. Every child was measured by a special sliding scale, with arm (with shoes on) weight taken at the same time of day with ordinary indoor clothes on and by a Fairbanks scale tested daily. The chest measure was taken by a steel tape at a level of nipples in boys, slightly above for girls, the clothing removed to undergarments. Full inspiration and expiration were induced as far as possible, but in many cases it was found very difficult to accomplish this, and in some few cases the measurements were rejected on this account. The vital capacity was taken on a wet spirometer, the same instrument used by Dr. Christopher in his work in Chicago. Each child was given only three trials to attain the highest point. This differed from the technique used in Chicago, as the children there were given repeated trials until the highest point possible was attained. The measurements from all the children of one age from 9 to 16, were averaged and the result compared with the average for the same age found at St. Louis and Chicago. The results were charted and compared with charts that were made by us from averaging the measurements of the children in eastern

cities. Ages were computed from last birthday as being practically accurate. The average monthly increments were not taken. We only measured children who had lived over two years in Colorado Springs, as less time spent at 6,000 feet altitude we did not consider enough to decidedly modify physical structure. The results were tabulated into two groups—those of the children who had lived two years or over in Colorado Springs and those who had been born and had lived in Colorado Springs since birth. As the first group showed only to a less degree what the second, or native, group showed to a more marked degree, we selected the latter as we judged that native born children were the best standard for accurate comparison for many reasons.

There are necessarily some differences between children living in Colorado and those living in Chicago and St. Louis not dependent upon climate at all, which might possibly influence our results in any comparative study, for instance, inheritance, as a large number of our children living in Colorado Springs were born of consumptive parents (the exact number being very difficult to estimate, but certainly enough to possibly seriously modify the development of a child, if, as some consider, physical characteristics are inherited). The nationality was probably more largely American than in the cities in the East, but this point, although important, we were unable to ascertain. The physical culture given the children, as having a direct bearing upon development, was probably one of the most important points to consider aside from climatic influence. This was found to be in favour of the children in the eastern schools who had regular classes for physical culture while the children living in Colorado Springs who were measured depended almost entirely upon their usual play and games and had no such special exercises tending to increase chest or vital capacity except to a comparatively limited

extent. Probably the children in Colorado were as a class better nourished, clothed and housed than those in the East, and had, of course, a further advantage of not living in a closely built city. This would of itself, possibly, make some difference. The hours confined in school were the same in both climates. It is further of interest to note that the children measured in the schools of Chicago were, it is stated, superior in size and physical development to those measured in other eastern cities, so that our averages were compared with the best, or a high eastern average of measurement to a large degree. It was also recognised by us that the social condition of the children was important as it has been found that the favoured class differs from the poor in favour of the higher physical development of the former. On this point, however, we could find no pronounced difference more than we have stated before. The poor in Colorado Springs are, generally speaking, under somewhat better physical environment than the poorer classes in the East, but it is also true that perhaps the favoured class do not use the public schools to the same extent, so that all factors considered, we can say that the comparison between the children of St. Louis or Chicago in the public schools and those in Colorado Springs in the public schools offers no more unusual conditions than a comparison between public school children of any city and those in a town of 30,000 inhabitants, the only exception in our case being the large phthisical inheritance and the climate.

The climatic factor present in Colorado Springs consists of an altitude of a mile or more (6,100 feet) above sea level, a rainfall of 14 inches annually, a low humidity and a condition of climate that allows playing in the open air, with a few exceptions, every day in the year, cool in summer, cold and dry in winter, the soil gravel for 60 feet in depth with natural surface inclination for drainage.

It is an opinion frequently expressed and generally believed, that the inhabitants of high altitudes have an increased chest measure. Such records as we have been able to consult on this subject have been measurements taken at unusually high altitudes (from 12,000 to 18,000 feet), and, without exception, in the case of individuals who were engaged in such hard labour as carrying heavy loads or climbing over a very rough and precipitous country, or upon natives who had inhabited such elevated regions for many generations. No doubt, among parts of Colorado settled by hardy pioneer stock inured to hardship and living an outdoor life, constantly engaged in hard muscular exercise, we would also find a high chest measurement only at least partially due to altitude ; but in Colorado Springs our people live on a plain, and not in among the mountains, so that mountain climbing is not a factor in every day life. Indulging in hard labour is also the exception and not the rule, or usual occupation of the inhabitants. Also, the children we measured represent but one generation removed from low altitude dwellers, and, most important of all, a large percentage, which we roughly estimated at between 50 and 60 per cent. of our children, were directly descended from parents one or both of whom were invalids suffering from consumption and living in Colorado Springs to recover their health. In such instances the child was born after the disease was advanced far enough in the parents to make a climatic change a necessity. Such children are not usually supposed to possess a marked advantage in physical structure over children of normally healthy parents ; but, on the contrary, will possibly often show a tendency towards some physical defect directly inherited. At least, this we would expect to be true under ordinary climatic conditions. We therefore were measuring children who had to a large degree inherited what we can call a dimin-

ished vitality, but who were born and had lived under climatic conditions said to be antagonistic to such diminished vitality or to any tubercular taint. Our results, as shown by the charts, corroborate the popular idea of an increase of chest measurement at 6,000 feet altitude in individuals born and living at such altitude; but our charts show more than this. Our comparisons proved not only greater girth of chest and vital capacity in native born Colorado children as compared to children in St. Louis or Chicago, but we further found that in exactly the same ratio, the Colorado children were taller and weighed more. This was constant, and occurred almost without exception at all ages from 9 to 16; so it would seem from this result that we have in Colorado Springs a climatic factor, which, directed towards development, induces a greater respiratory range, a better oxidation and increased cardiac power, so stimulating nutrition as to produce a child above the normal average in chest measure, vital capacity, height and weight. It appears as if Nature, working upon the development of children at this altitude, does not develop one organ or organs while the others lag behind, but stimulates the entire structures to a symmetrical development. This result is no doubt due to many causes, such as, primarily, thin air and a dry soil with an excess of sunshine, enabling children to play out of doors both summer and winter. Perhaps extra care is given the children instinctively, the parents fearing a repetition of their own disease in the offspring.

Only further study in the years to come can determine these points. While, of course, it is still uncertain without further comparative tests, it is we think reasonable to suppose that the mental growth of native born Colorado children is also in advance of the normal; certainly the inference is very strong, as from Dr. Christopher's work in

Chicago, it was proved and shown to be a law, that physical development occurs corresponding with increased mental power.*

We are well aware that this little work of ours is not final, and in the future we hope to be enabled to continue it, and by studying the nervous system at the above ages, to determine by comparative tests the normal for Colorado Springs.

* It is clear from the foregoing charts and tables that on the average those pupils who have made great intellectual advancement are on the whole taller, heavier, stronger, possessed of greater endurance, and larger breathing capacity than those who have made less advancement. These observations also indicate that a physical factor, as well as the intellectual one now entirely relied upon, should be introduced in the grading of pupils. This physical factor is particularly desirable in determining the fitness of children to enter the first grade, where so many children under the legal school age are entered by misguided parents to the great detriment of the children.

In this connection mention must be made of a fact well known to all. In every school there are a few pupils who are small in stature and light in weight, and yet exceedingly bright in their school work. It is not very uncommon to find that the best pupil in the room is the smallest, and possibly the youngest. These small, bright pupils constitute a class by themselves; they are exceptions to the general rule and must, like all exceptions, receive special consideration. Such children cannot be considered normal, and I venture the assertion that the true explanation of them will be found to be of greater medical than pedagogical interest.

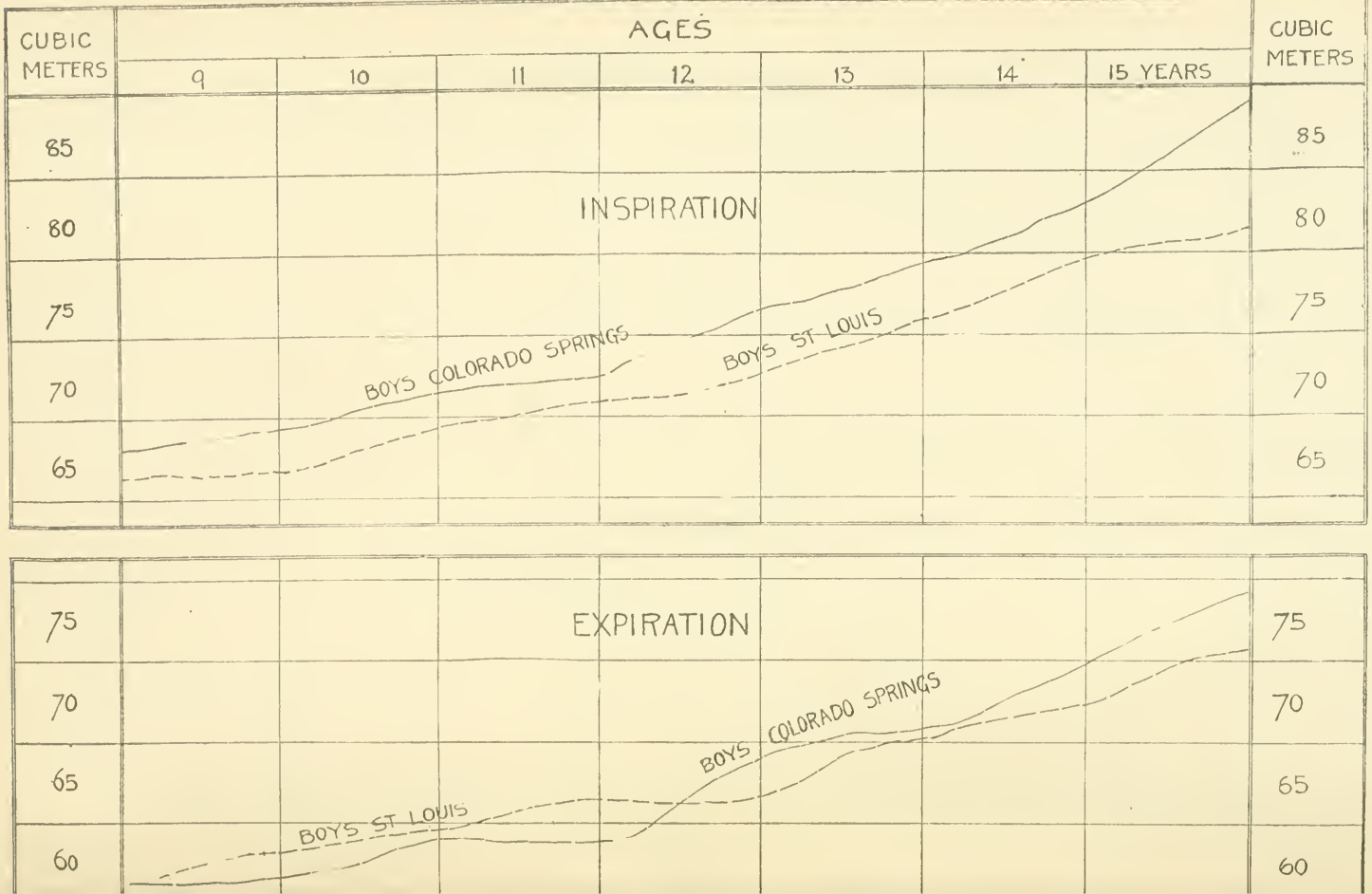


Chart showing average chest measurements. Boys of Colorado Springs (native born) compared with boys of St. Louis.

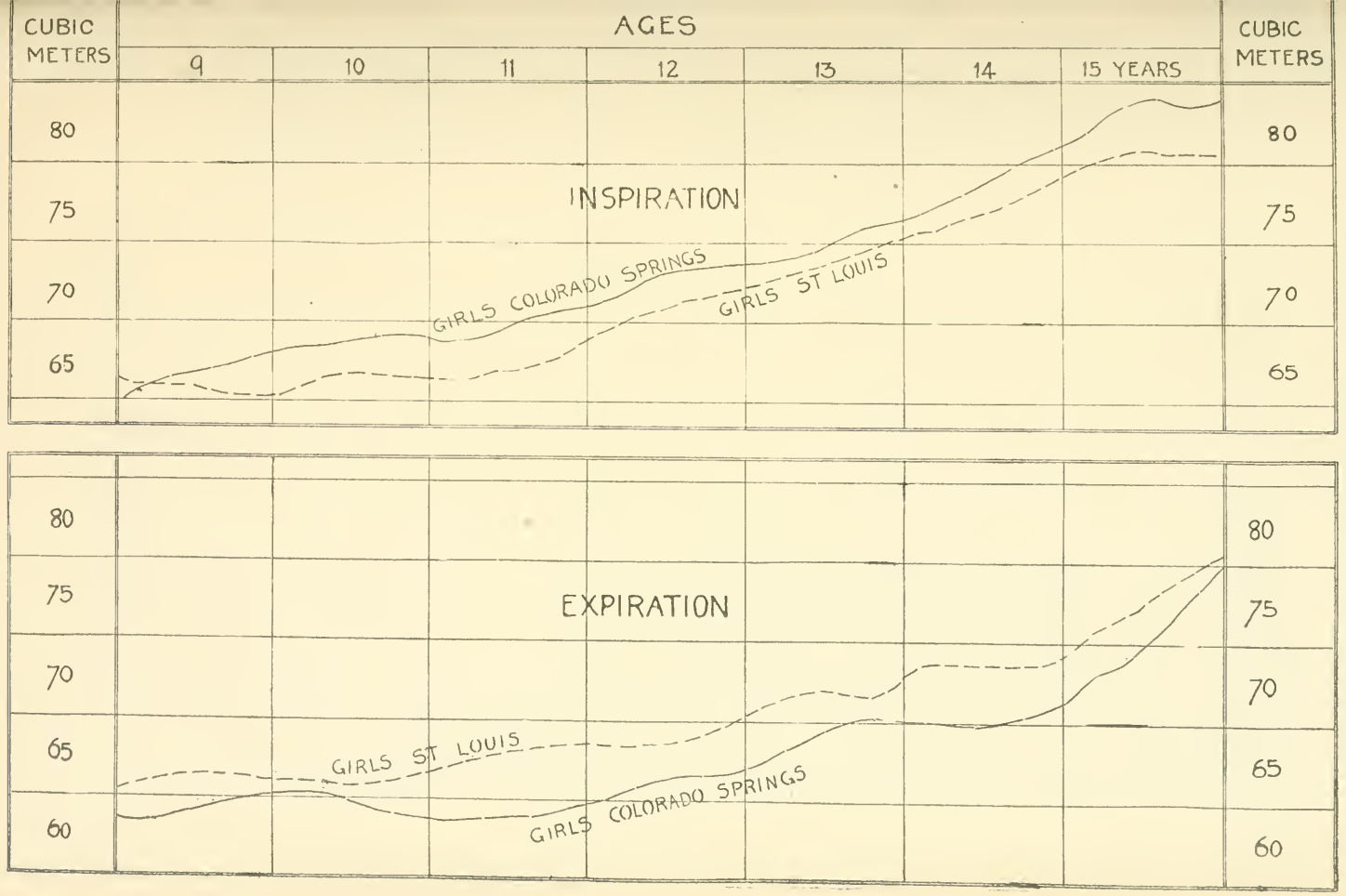


Chart showing average chest measurements. Girls of Colorado Springs (native born) compared with girls of St. Louis.

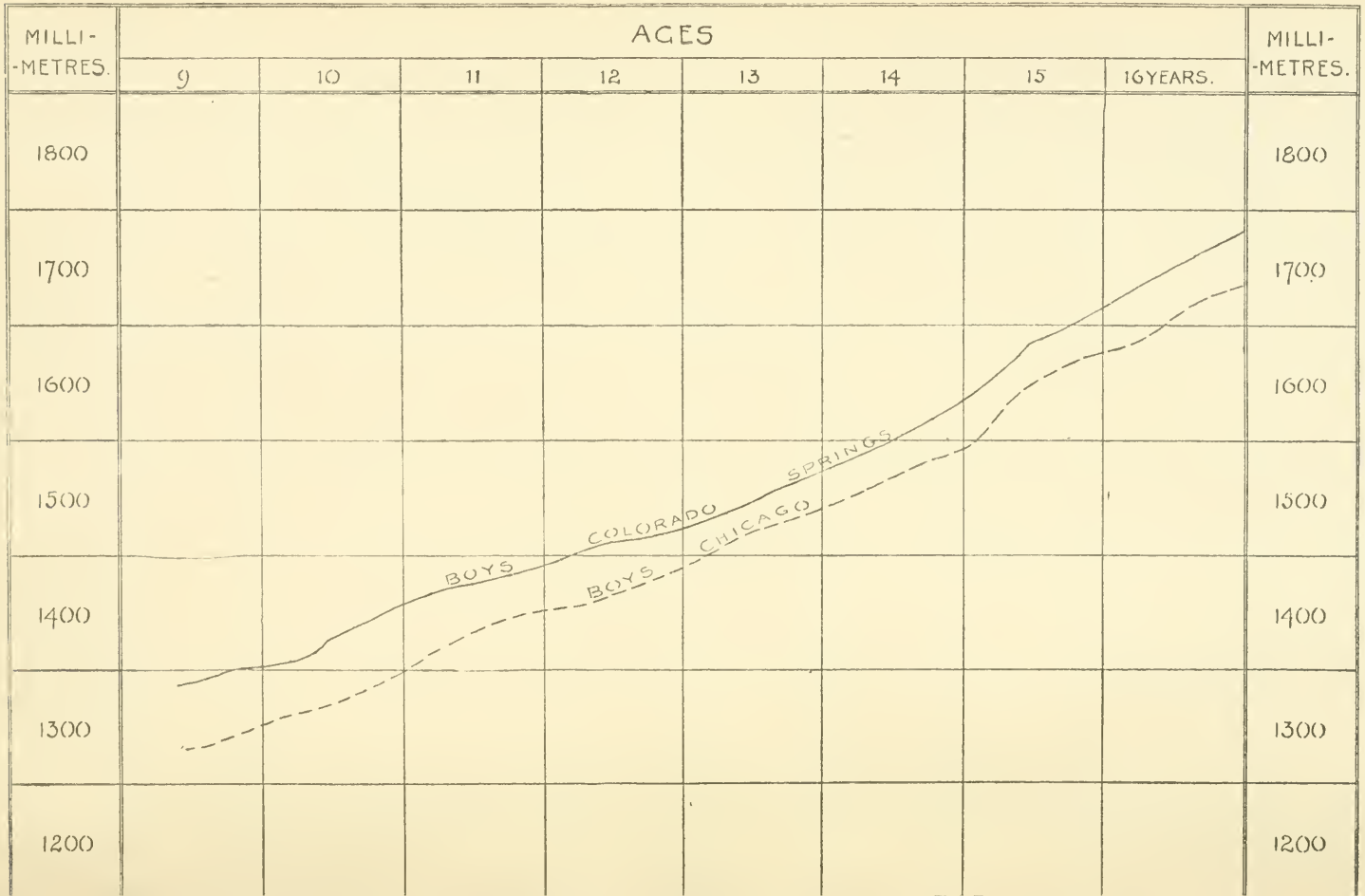


Chart showing average height in millimetres. Boys of Colorado Springs (native born) compared with boys of Chicago.

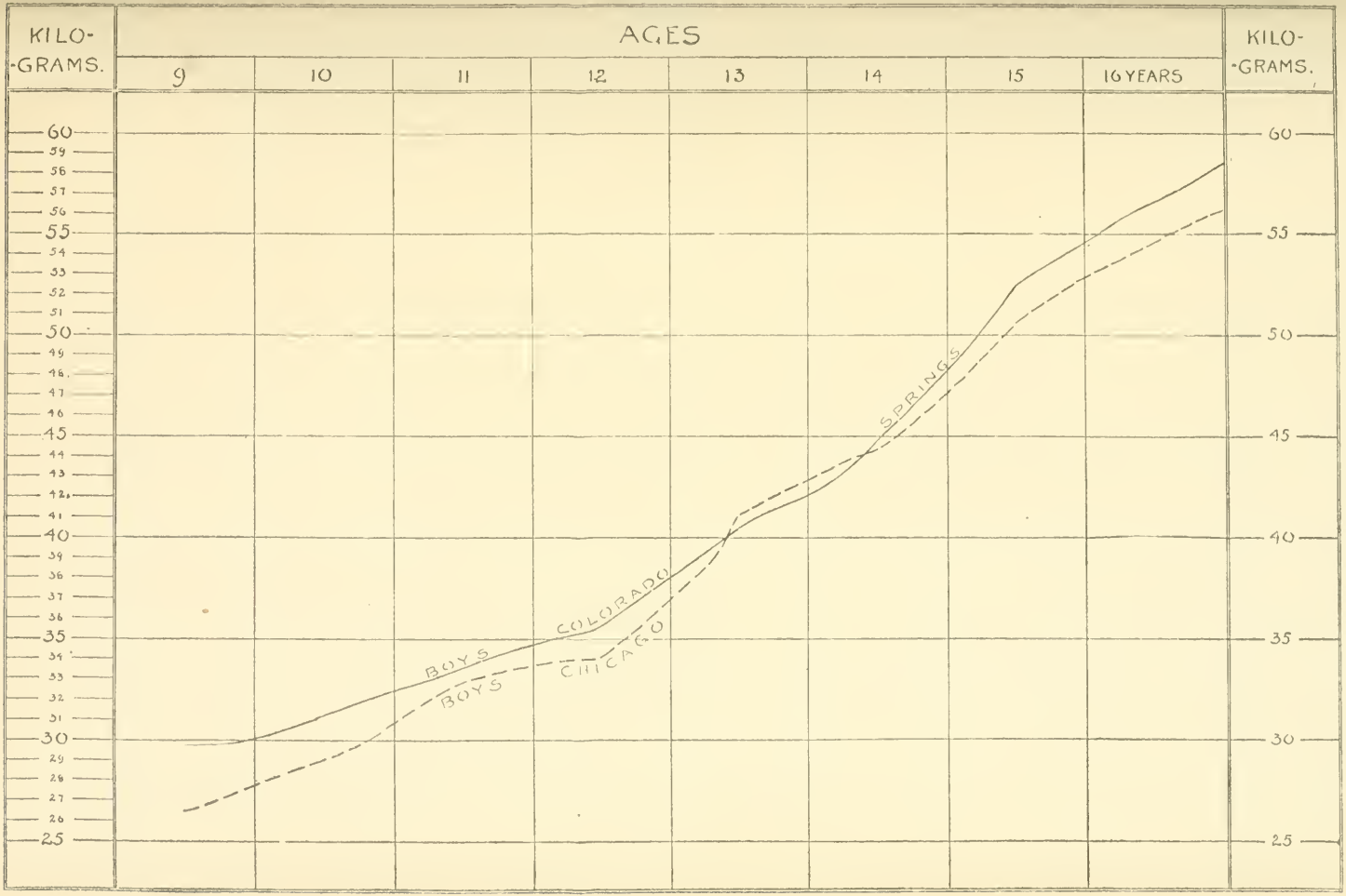


Chart showing average weight in kilograms. Boys of Colorado Springs (native born) compared with boys of Chicago.

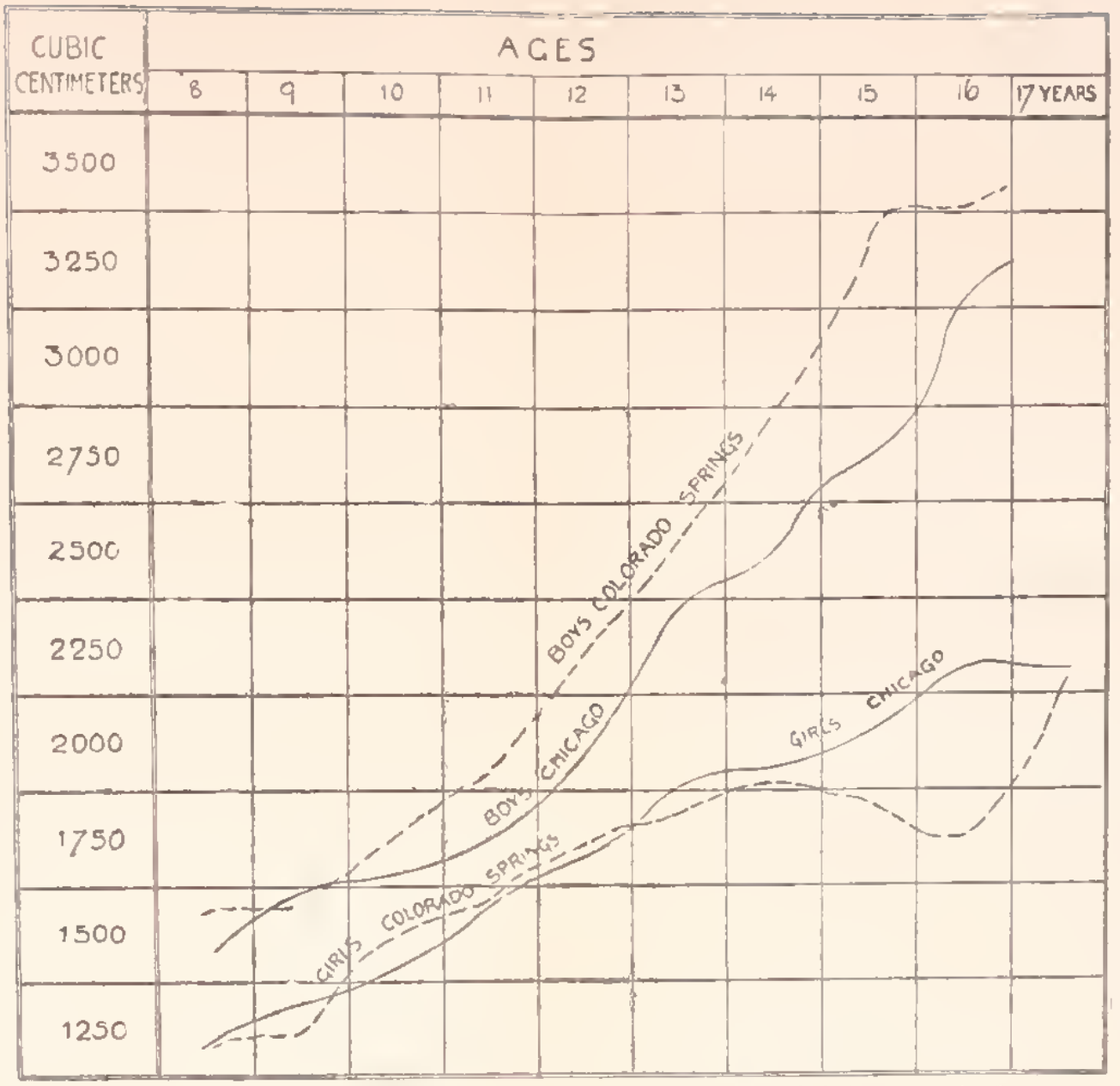


Chart showing lung air capacity by wet spirometer. Boys and girls born in Colorado Springs compared with boys and girls of Chicago, Ill. Both from public schools

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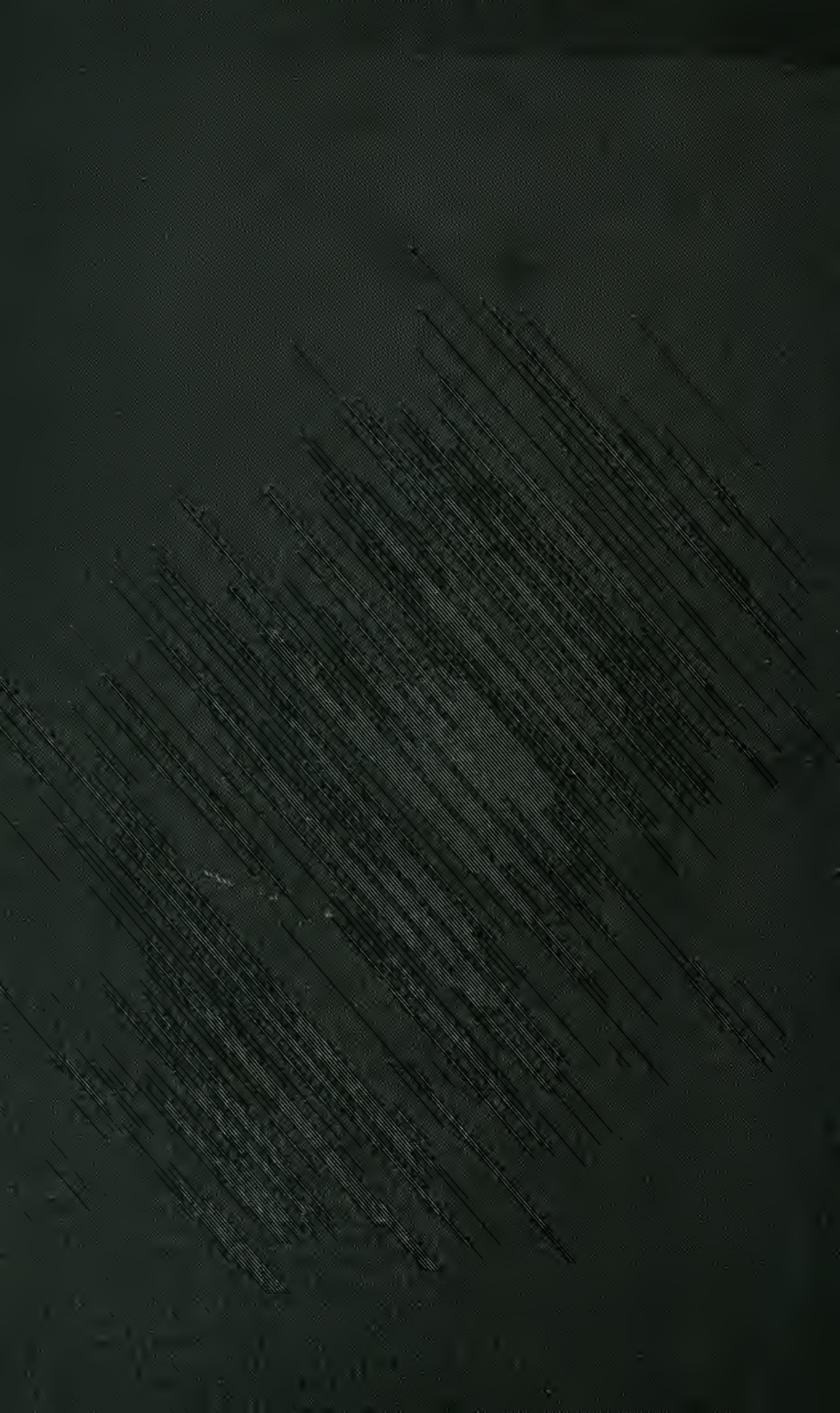
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